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ABSTRACT

Designed to provide K-12 teachers in Oregon with a scope and sequence, a listing of resources, and a large collection of ready-to-use activities for teaching computer literacy, this handbook is divided into nine sections which contain computer literacy instruction keyed to behavioral objectives. Topics covered include: (1) the history of computing; (2) career opportunities directly and indirectly related to computers; (3) the use of computers at home, school, and work; (4) current limitations and future uses of computers; (5) a vocabulary of common computer terms; (6) the structure and function of computer systems; (7) the care and operation of computer equipment and storage media; (8) program generation and usage; and (9) the moral and ethical implications of computer technology. The activities are coded to match the goals in the scope and sequence, and applicable grade levels are indicated. Each activity is prefaced with a description that indicates: the title of the activity, the objective the activity falls under, the grade level or levels to which the activity applies, a description of the activity, materials needed, and additional resources, including suggested answers, cross references to related materials, and sources for more information. (JB)

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THE
"Do I have to teach Computer Literacy?"
HANDBOOK

K-12
SCOPE & SEQUENCE GUIDE
with teaching activities for each objective

MASTER

IR012105

Written by:
West Linn, Lake Oswego, Oregon City, North Clackamas School Districts
WLOCNC
Computer Consortium

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MASTER

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	E. Goal 5	Buff
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	H. Goal 8	Pink
	I. Goal 9	Blue

INTRODUCTION

Revision, reorganization, and additions are the key to the second edition of The "Do I Have To Teach Computer Literacy??" Handbook. As the influence of computers and interested teachers has grown in the schools, the need for these changes has become apparent.

Our original goal for this guide was to provide the teacher with a scope and sequence, a listing of resources, and most importantly, a large collection of ready-to-use activities. The activities were coded to match the goals in the scope and sequence and also indicated applicable grade levels. In line with these objectives, we have revised many of the activities so that they are more usable at the indicated grade level. We also added many activities, most of which have been used and tested in the classroom.

A major change was to break the large book up by grade levels. Thus, there are now five booklets: K-3, 4-6, 7-8, 9-12 and a master book that contains all the information of the separate booklets. Each section has some duplication, such as the scope and sequence, resources, and general teacher information, but most activities are unique to each booklet. If you have one of the booklets, but feel you need more activities, we recommend that you make use of one or more of the other grade level packets.

The numbering system at the top of each page is keyed to a general goal and a specific objective under the goal. For example:

Activity 3.5.2 would indicate that this is an activty under:

GOAL 3: The student will learn about the use of computers at home, school, and work.

Objective 5: Describe current computer trends in entertainment.

Activity 2: This is the second activity for this objective.

Note that the listed order of the activities may not be the order for teaching. Also, a "0" objective indicates that the activity is general information for all of the goal. For example, 5.0.2 is a glossary which is used for all of goal 5.

Each activity is prefaced with an activity sheet that describes it. It indicates:

1. The title of the activity.
2. The objective the activity falls under.
3. The grade level or levels for which the activity applies.
4. A description of what the activity is.
5. What materials are needed for the activity.
6. Additional resources, which includes suggested answers, cross references to other related activities, and sources for more information.

You have permission to copy materials from these guides for classroom use. Your responsibility to these documents, though, is to send one or more of your activities for computer literacy that you would like to see in another revision. On the following page is a blank activity sheet to get you started. Send your activities and comments to:

Allan Dunn

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For additional copies of these guides, please contact:

Curriculum Department

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Reference No. 3.

ACTIVITY TITLE:

OBJECTIVE:

GRADE LEVELS: K-3 4-6 7-8 9-12

DESCRIPTION:

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

1983 - 1984

PROJECT PARTICIPANTS

Participants	School	Subject Area(s)	Grade Levels Taught
WEST LINN SCHOOL DISTRICT #3:			
Judy Waterbury	West Linn High School	Business Education	9-12, Adult
Barbara Hillyard	Bolton Middle School	Math & Computer Science	7- 8, Adult
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LAKE OSWEGO SCHOOL DISTRICT #7:			
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OREGON CITY SCHOOL DISTRICT #62:			
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DEFINITION OF COMPUTER LITERACY

To be computer literate one must be able to define, discuss, and/or demonstrate:

- the use of computers (past, present, future)
- how computers work
- how computers are programmed
- how to use the computer
- how computers affect our society

GENERAL GOALS

The student will learn:

1. The history of computing.
2. About career opportunities directly and indirectly related to computers.
3. About the uses of computers at home, school, and work.
4. About current limitations and future uses of computers.
5. A vocabulary of common computer terms.
6. About the structure and function of computer systems.
7. How to care for and operate the computer equipment and storage media.
8. Program generation and usage.
9. About the moral and ethical implications of computer technology.

SCOPE AND SEQUENCE

The X indicates instruction for that level should occur.

1. The student will learn the history of computing.

	K-3	4-6	7-8	9-12
The student will:				
1.1 Describe the contributions of various people to computing.			X	X
1.2 Develop a timeline of major computing events.		X	X	X
1.3 Describe the historical methods used for storing information prior to electronic computers.	X	X	X	X
1.4 Describe the growth of computing hardware development.	X	X	X	X
1.5 Describe the development of computer languages.			X	X
1.6 Describe social pressures behind technological development	X	X	X	X

SCOPE AND SEQUENCE

The X indicates instruction for that level should occur.

2. The student will learn about career opportunities directly and indirectly related to computers.

	K-3	4-6	7-8	9-12
The student will:				
2.1 List examples of careers created directly by the computer industry (programmer, systems analyst, data processing, maintenance).	X	X	X	X
2.2 List examples of career affected indirectly by the computer industry (secretary, clerk, engineering).		X	X	X
2.3 Describe careers offered by local businesses that make use of computer equipment.			X	X
2.4 Describe skills required for computer related careers (courses recommended).			X	X
2.5 Describe changes made in jobs because of the computer.			X	X
2.6 Be aware that computer-related skills and experience will rapidly become requirements for a wide variety of careers.			X	X

SCOPE AND SEQUENCE

The X indicates instruction for that level should occur.

3. The student will learn about the use of computers at home, school, and work.

The student will:	K-3	4-6	7-8	9-12
3.1 Describe current uses of computers in the home (record keeping, entertainment, protection, communications, and automation).	X	X	X	X
3.2 Describe how the computer is currently used in the school for administrative and instructional purposes (CIS, attendance, library access, drafting, graphic arts, simulation, word processing).	X	X	X	X
3.3 Describe current uses of computers in business and industry (collecting and processing data, decision-making, robotics, word processing).		X	X	X
3.4 Describe current uses of computers in government (census taking, decision making and planning, law enforcement, tax collection, public opinion polls, mail, mapping, space exploration and development, research and development).		X	X	X
3.5 Describe current computer trends in entertainment (movies, TV video, music, art).	X	X	X	X
3.6 Discuss the potential effects of computer use in the home, school, and work environment.		X	X	X
3.7 List the criteria for determining the need for computer equipment in given applications.			X	X
3.8 List examples of computer applications which are invisible to the general public.		X	X	X
3.9 Develop a questioning attitude toward errors in computer output ($3,462 monthly water bill).		X	X	X

SCOPE AND SEQUENCE

The X indicates instruction for that level should occur.

4. The student will learn about current limitations and future uses of computers.

	K-3	4-6	7-8	9-12
The student will:				
4.1 Recognize characteristics that distinquish machine artifical intelligence from human intelligence.			X	X
4.2 Recognize limitations of the communication capacities of computers.	X	X	X	X
4.3 Be aware that computers do not possess human emotions.	X	X	X	X
4.4 Identify common task which are not suited to computer solution.	X	X	X	X
4.5 Discuss social and technological factors that contribute to or inhibit future development of computer applications.			X	X
4.6 Discuss future computer applications.	X	X	X	X

SCOPE AND SEQUENCE

The X indicates instruction for that level should occur.

5. The student will learn a vocabulary of common computer terms.

We recommend that vocabulary not be taught in isolation, but in conjunction with other concepts, specifically, goals 6 and 7.

	K-3	4-6	7-8	9-12
The student will define and spell:				
5.1 Terms related to background information such as abacus, binary, punch card, and codes (Hollerith, ASCII, etc.).		X	X	X
5.2 The terms "hardware" and "software" and differentiate between the two.		X	X	X
5.3 Terms related to hardware such as computer, calculator, electronic games, mini, micro, and main frame computers.		X	X	X
5.4 Terms related to the function of a computer such as memory, input, output, arithmetic unit, control unit and C.P.U.		X	X	X
5.5 Terms related to software such as program, languages (BASIC, Logo, etc.) and language types.			X	X
5.6 Terms related to programming and operation such as run, load, save, boot, bug, debug, and data base.	X	X	X	X

SCOPE AND SEQUENCE

The X indicates instruction for that level should occur.

6. The student will learn about the structure and function of computer systems.

	K-3	4-6	7-8	9-12
The student will:				
6.1 Name the five functional units common to all computers and explain their interaction.		X	X	X
6.2 Describe how the computer operates in terms of input, processing, and output of information.	X	X	X	X
6.3 Recognize that computer operation depends on a sequence of instruction.	X	X	X	X
6.4 Describe the key advantages of computers - speed, accuracy, mass storage capabilities.		X	X	X
6.5 Describe different methods to get information into, stored, and out of the computer. (Example: Input devices = keyboard, cards, light pen, etc.).	X	X	X	X
6.6 Understand the relationship between the binary system (base 2) and Yes-No decision making.		X	X	X
6.7 Describe characteristics of various types of computer systems (Example: single computer, networks, batch processing).			X	X
6.8 Compare and contrast important characteristics of major computer brands.		X	X	X

SCOPE AND SEQUENCE

The X indicates instruction for that level should occur.

7. The student will learn how to care for and operate the computer equipment and storage media.

	K-3	4-6	7-8	9-12
The student will:				
7.1 Learn how to set up, maintain, and store computer equipment.		X	X	X
7.2 Describe and demonstrate proper care of storage media.	X	X	X	X
7.3 Demonstrate how to begin operation, load and run program, and end operation.	X	X	X	X
7.4 Demonstrate recognition of errors in interacting with computers and is able to correct them.	X	X	X	X
7.5 Demonstrate use of keyboard and special features (editing, control, etc.).	X	X	X	X
7.6 Demonstrate how to save, delete, and protect programs on peripherals.		X	X	X
7.7 Demonstrate keyboarding skills using the touch method.	X	X	X	X

The X indicates instruction for that level should occur.

8. The student will learn program generation and usage.

	K-3	4-6	7-8	9-12
The student will:				
8.1 Demonstrate problem solving skills such as flow charting, outlining, etc.	X	X	X	X
8.2 Analyze programs and demonstrate what the output will be.		X	X	X
8.3 Modify programs to obtain different results.		X	X	X
8.4 Recognize that there are a variety of approaches in successfully writing a program.		X	X	X
8.5 Write simple computer programs.		X	X	X
8.6 Locate program errors and make corrections.		X	X	X
8.7 Document a program.		X	X	X
8.8 Demonstrate successful use of commercially prepared programs.		X	X	X
8.9 Determine criteria for deciding appropriate use of computers and software.			X	X

The X indicates instruction for that level should occur.

9. The student will learn about moral and ethical implications of computer technology.

	K-3	4-6	7-8	9-12
The student will:				
9.1 Recognize the impact of computers on the privacy of the individual.			X	X
9.2 Discuss the effects of computers replacing human jobs.			X	X
9.3 Be aware of existing and potential effects of computers on individual life, family, and social relationships.			X	X
9.4 Recognize how computers affect decision making and value judgments.			X	X
9.5 Discuss computer crime and software piracy.		X	X	X
9.6 Explore other current and relevant issues.	X	X	X	X

COMPUTER LITERACY RESOURCES

***** Resources marked with asterisks are strongly recommended for acquisition and use *****

RESOURCES - A.V. MATERIAL

1.	Computer Awareness Filmstrip/Cassette Set	Society for Visual Education 1345 Diversey Parkway Chicago, Illinois 60614
2.	Computer History Slides Two Sets of Slides with Written Descriptions of Each Slide	Jim Neideigh Computer Service Department North Clackamas School Dist. Milwaukie, Oregon 97222
3.	Computer Literacy: The First Step Filmstrip/Cassette Set	Educational Dimensions Group Box 126 Stamford, Connecticut 06904
4.	Computer Programming Filmstrip/Cassette Set	Bergwall Productions, Inc. 339 Stewart Avenue Garden City, New York 11530
5.	The Computer Programmer	PBS - Series Aconn Computers
*** 6.	Computers: From Pebbles to Programs Filmstrip/Cassette Set	The Center for Humanities Communications Park Box 1000 Mount Kisco, New York 10549
7.	Computers in Our Society Filmstrip/Cassette Set	Encyclopedia Britannica Educational Corporation 425 N Michigan Avenue Chicago, Illinois 60611
8.	Discovering Computer Music Color Film	Clackamas County ESD Media Library
9.	First Philadelphia Computer Music Festival (Record)	Creative Computing P.O. Box 789-M Morristown, New Jersey 07960
10.	Information Processing Filmstrip/Cassette Set	Bergwall Productions, Inc. 339 Steward Avenue Garden City, New York 11530
11.	Introduction to Data Processing	Educational Audio Visual, Inc. Pleasantville, New York 10570
12.	The Information Machine (Cardboard Computer)	Pacific Northwest Bell Film Library Room 2B02 1600 Bell Plaza Seattle, Washington 98191 Toll Free #1-800-426-0205 (Will send class set - 1 per 2 students)

13.	Introduction to Systems Analysis and Programming	Educational Audio Visual, Inc. Pleasantville, New York 10570
14.	TRON (movie)	Walt Disney Productions
15.	War Games (movie)	

RESOURCE - BOOKS

	1.	A Guided Tour of Computer Programming in Basic by Thomas A. Dwyer and Michael S. Kaufmann	Houghton-Mifflin Co.
	2.	Aftermath	Creative Publications P. O. Box 10328 Palo Alto, California 94303
	3.	A Pet in the Classroom By: Sharon Boren	Alan L. Boren Business Manager 1970 1/2 Columbia Street Eugene, Oregon 97403
***	4.	Are You Computer Literate? by: Karen Billings and David Moursund	dilithium Press P. O. Box 606 Beaverton, Oregon 97075
	5.	Be A Computer Literate By: Marion J. Ball and Sylvia Chard	Contact Your Local Bell Telephone System Education Specialist for Copies
	6.	Beginning Computer Science By: James L. Poirot and David N. Groves	Sterling Swift Co. P. O. Box 188 Manchaca, Texas 78652
	7.	Bits 'N Bytes About Computing By: Rachelle S. Heller and C. Dianne Martin	Computer Science Press 11 Taft Court Rockville, MD 20850
	8.	Computer Awareness By: Merle Wood	South-Western Publishing Co. 855 California Avenue Palo Alto, California
***	9.	Computers: A Student Guide By: Robert Cattoche	Oregon City Public Schools Oregon City, Oregon 97045
	10.	Computers and Computing By: Neill Graham	West Publishing 50 west Kellogg Blvd. P. O. Box 3526 St. Paul, Minnesota 55165
	11.	Computers for Kids By: Sally Greenwood Larsen	Creative Computing Press P. O. Box 789-M Morristown, New Jersey 07960

12.	Computers That Think? By: Margaret O. Hyde	Enslow Publishers Bloy Street & Ramsey Avenue Box 777 Hillside, New Jersey 07205
13.	Computer Tutor Junior	The Learning Works P. O. Box 6187, Dept. A Santa Barbara, California 93111
14.	Discovering Computers By: Mark Grank	Stonehenge Press in Association with the American Museum of Natural History
15.	Exploring the World of Computers By: Donald D. Spencer	Camelot Publishing Co., Inc. P. O. Box 1357 Ormund Beach, Florida 32074
16.	Future Shock By: Toffler	Bautam Books
***17.	Introduction to Computer In Education for Elementary and Middle School Teachers By: David Moursund	International Council for Computers in Education Dept. of Computers & Information Science
18.	Introduction to Computers and Data Processing By: Shelley and Cashman	Anahein Publishing
19.	Introduction to Data Processing By: Ribachard, Muscat, and Hall	McGraw-Hill Gregg Division New York, New York
20.	Katie and the Computer By: Fred D'Ignazio	Creative Computing Press P. O. Box 789-M Morristown, New Jersey 07960
21.	Meet the Computer	Highline School District 15675 Ambaum Blvd. S.W. Seattle, Washington 98166
22.	Megatrends By: Nesbitt	Warner Books
23.	Mindstorms, Children Computers and Powerful Ideas By: Seymour Papert	Basic Books, Inc. New York, New York, 1980
24.	My Friend the Computer By: Jean Rice	T.S. Denison & Company, Inc. Minneapolis, Minnesota
25.	The Computer: An Everyday Machine By: Enid Squire	Addison-Wesley Publishing Co. Menlo Park, California

26.	The Computer Tutor By: Gary W. Orwig and William S. Hodges	Winthrop Publishers, Inc. 17 Dunster Street Cambridge, Massachusetts
27.	The Mind Tool By: Neill Graham	West Publishing 50 West Kellogg Blvd. P. O. Box 3526 St. Paul, Minnesota 55165
28.	The Personal Computer Book By: Peter A. McWilliams	Prelude Press Box 69773 Los Angeles, California 90069
29.	What to do Until the Computer Comes (And then what to do Computer Science) By: Allan Dunn	Oregon City High School Oregon City, Oregon 97045
30.	Word Processing Concepts By: Mona Casady	South-Western Publishing Co. 855 California Avenue Palo Alto, California 94304

RESOURCES - "HANDS-ON" MATERIALS

1.	Computer Discovery Two Computer Disks, Coordinated with Teacher Guide and Student Workbook	Science Research Associates (SRA)
*** 2.	The Computer Parts Kit Computer Disks, Tape, Tubes, Transistors, Circuit Boards, etc., with Explanatory Material and Suggested Class Activities	Educational Computer Shoppe Route 3, Box 601 Cambridge, Minnesota 55008
3.	Computers Past and Present Wall Chart, Teachers Guide, Six Spirit Masters	Radio Shack
4.	Computer - Rage A Computer Related Board Game	Creative Computing P. O. Box 789-M Morristown, New Jersey 07960

RESOURCES - PERIODICALS AND JOURNALS

1.	Classroom Computer News	Box 266 Cambridge, Massachusetts 02138
*** 2.	Creative Computing	P. O. Box 789-M Morristown, New Jersey 07960

***	3. Electronic Learning	Scholastic Inc. 902 Sylvan Avenue Box 2001 Englewood Cliffs, NJ 07632
	4. InfoWorld (A News Weekly for Micro-Computer Users)	375 Cochituate Road Box 837 Farmingham, MA 01701-9987
	5. OMNI	P. O. Box 908 Farmingdale, New York 11737
***	6. The Computing Teacher	Dept. of Computers & Infor. Science ℅ David Moursund, Editor University of Oregon Eugene, Oregon 97403
	7. The Futurist	World Future Society 4961 St. Elmo Avenue Washington, D.C. 20014
	8. The Oregon Mathematics Teacher	℅ Richard Brannon 545 Wellington Eugene, OR 97402
	9. "Technology and Work"	Scientific American September 1982

RESOURCES - SOFTWARE

1. Apple Logo (A Version of MIT LOGO)	Apple Logo
2. Applewriter II or IIe (Professional Word Processing)	Apple
3. Bank Street Writer (Simplified Word Processor)	Broderbund
4. Children's Carrousel (Preschool - 2nd. Grade)	Dyna Computer, Inc.
5. Crossword Magic (Crossword Puzzle Generator)	L & S Computerware
6. Cyber Logo	Cybertronics International 999 Mt. Kemble Morristown, New Jersey 07960

7.	Delta Drawing	Spinnaker 215 1st. Street Cambridge, Massachusetts 02142
8.	Graphics Magician (Graphics Animation)	Penguin Software
9.	Keyboarding on Microcomputers	Southwestern Publishing Co. 855 California Avenue Palo Alto, California 94304
10.	Krell Logo	Krell
11.	Letter - Man (Typing Skills Program)	Behavioral Engineering
12.	Mastertype (Typing Skills)	Lightning Software
13.	MECC (Many Titles and Subjects)	Minnesota Educational Computing Consortium or OECC
14.	Miliken Math (Good for 1-1 Contact)	Miliken Publishing
15.	Rocky's Boots (Problem Solving - Creative Construction)	The Learning Company
16.	Screenwriter II or IIe (Professional Word Processing)	On-Line
17.	Terrapin Logo (A Version of MIT Logo)	Terrapin
18.	The Game Show	Computer Advanced Ideas 1442 Walnut Street Suite 3 Berkley, California 94079
19.	Type Attack (Typing Skills Program)	Sirius Software
20.	Typing Strategy (Typing Skills)	Behavorial Engineering
21.	Typing Tutor (Typing Skills)	Microsoft

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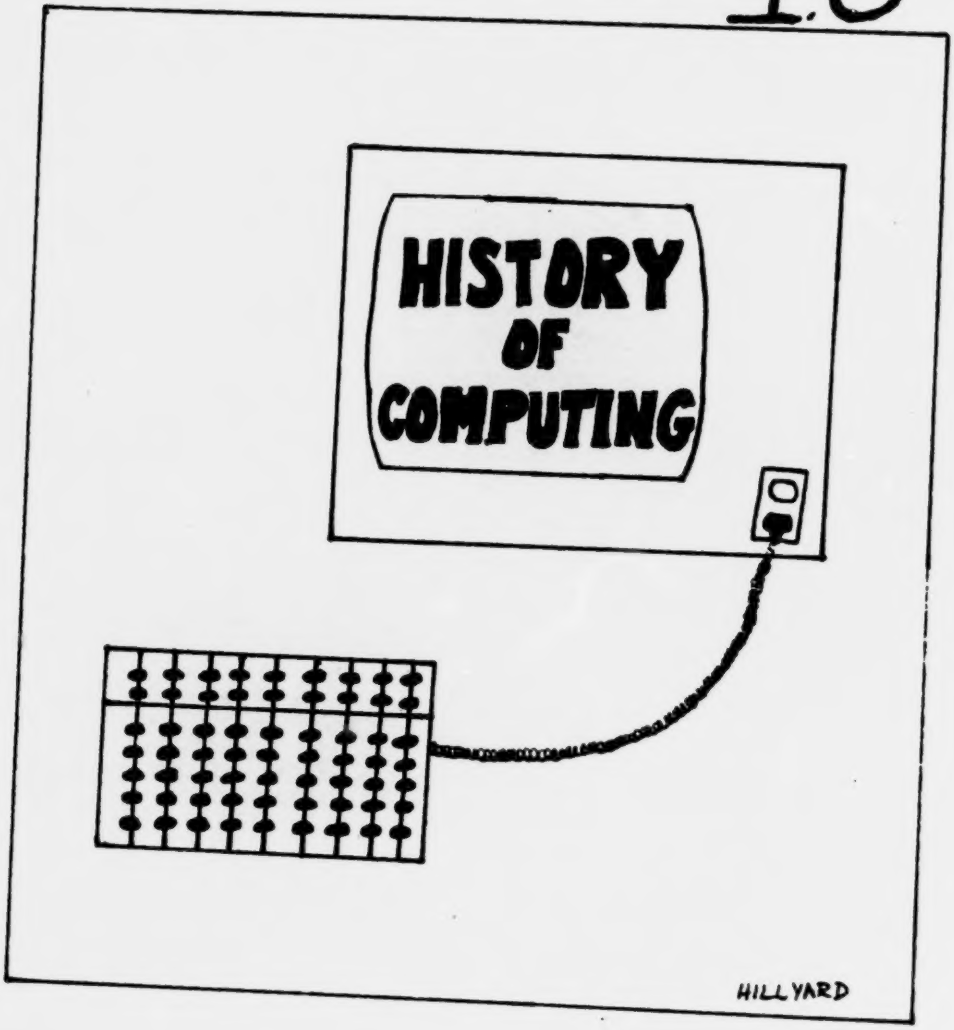

HISTORY
OF
COMPUTING
HILLYARD

SCOPE AND SEQUENCE

The X indicates instruction for that level should occur.

1. The student will learn the history of computing.

	K-3	4-6	7-8	9-12
The student will:				
1.1 Describe the contributions of various people to computing.			X	X
1.2 Develop a timeline of major computing events.		X	X	X
1.3 Describe the historical methods used for storing information prior to electronic computers.	X	X	X	X
1.4 Describe the growth of computing hardware development.	X	X	X	X
1.5 Describe the development of computer languages.			X	X
1.6 Describe social pressures behind technological development	X	X	X	X

1.0.1
Reference No.

ACTIVITY TITLE: Historical Resources Unit - Teacher Information

OBJECTIVE: The student will learn the history of computing.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	*

DESCRIPTION: The following pages are general information on the history of computing and explanations of computer equipment and concepts. These pages should be reviewed by the teacher before using activities from this unit. There are some suggested activities within the text which may be appropriate at this age level. Some of the text might be appropriate for information handouts for students.

MATERIALS REQUIRED: These resources are excellent and should be purchased!

Are You Computer Literate? by Billings and Moursund, dilithium Press (paperback book).

Computers: From Pebbles to Programs, the Center for Humanities, Communications Park, Box 1000, Mount Kisco, New York 10549 (filmstrip and cassette set).

Computer History Slide Set, 160 Slides of historical computing with a written description. Contact: Jim Neideigh, Owen Sabin Skills Center, Computer Services Department, North Clackamas School District #12.

ADDITIONAL RESOURCES:

HISTORY OF COMPUTERS

The earliest type of computing probably took place with ancient man collecting pebbles to represent the number of items he possessed. He may have kept them in a pouch or in a place easily accessible to him to which he could add or subtract stones. In other cultures, the stones were replaced by notches in a stick, knots tied in a cord, or marks on a clay tablet. Whatever the method, all devices were a way to represent numbers.

The computer may be referred to as a digital computer. The word digital comes from "digits" or fingers. Fingers were man's computer. Until the nineteenth century most calculating was done mentally. To aid this process, Roman schools taught finger counting and actually devised methods of doing mutiplication and division on their fingers. The Roman student was required to learn the multiplication tables 1 - 5. He would figure the products between 5 and 10 on his fingers.

One of the earliest computers was the sand table. It was made by marking three grooves in the sand with a maximum of 10 pebbles in each groove. Each time man wanted to increase the counter by one, he would add a pebble in the right hand groove. When ten pebbles were collected in the right groove, they were removed and one pebble was added to the left groove. The word "calculate" is said to be derived from the Latin word "calcis", meaning limestone, because limestone was used in the first sand tables.

Soon, however, even this kind of computer was not enough to keep track of man's calculating, and so the abacus was developed. Abacus comes from the word "abaq", the Arab word for dust. The first abacus was simply a portable sand table; a board with dust strung across it. Eventually the board was replaced by a frame, the grooves by wire, and the pebbles by beads. More than three grooves or wires were attached to the abacus allowing man to count to higher numbers. Different versions of the abacus appeared in many countries and are still used in many places. People using the abacus for calculations can become extremely skilled in rapid computation. In some tests, an expert using an abacus has proven to be faster than a person using a mechanical calculator. The abacus remained the only computing device for over 4,000 years. Tables of numbers were developed by the Greek and Roman cultures as well as the Mesopotamian and the Egyptians. However, the abacus still remained as the only calculating device.

Arab, Hindu, and European mathematicians were the first to develop techniques of written calculation. Those techniques were in the form of tables. They did the same type of calculation the Romans did, only in written form. Probably the most famous approach was used in 1614 by John Napier, a Scottish mathematician who developed Napier's Bones or rods. They are referred to as "bones" because the first set was made from ivory and resembled a set of bones. Later they were made from wood. The "bones" were an attempt to reduce the tedious calculations involving large numbers.

Napier is probably more well known for the invention of logarithms, which is a way to turn the problem of multiplication and division into simple operations of addition and subtraction. The invention of logarithms led directly to the development of the slide rule in 1630. The principle behind this device is that of two scales moving against each other. In this way, multiplication is rapidly accomplished.

The next milestone in data processing came in 1642 when Blaise Pascal, at the age of 19, designed and built a small and simple machine. Working in his father's tax accounting office, he decided there must be some way of relieving the drudgery of adding long columns of numbers. He devised a mechanized calculating device operated by a series of dials attached to wheels that had the number zero to nine on their circumferences. When a wheel had made a complete turn, it advanced the wheel to the left of it. Indicators above the dial showed the correct answer.

Gootfried Wilhelm Leibniz then invented a device known as the Leibniz Wheel in 1671. The mechanism enabled him to make a machine which not only did addition and subtraction, but also multiplication and division. Operating through a complex series of wheels and cylinders linked to a crank carriage, it was more sophisticated than Pascal's machine. However, like many other machines of this period, it lacked mechanical precision in its construction and was very unreliable and awkward to use. Both Pascal and Leibniz were ahead of the technology of their time, but neither machine was dependable. Only in the past 25 years have we succeeded in building machines that will calculate accurately, thus solving a dilemma that was identified in 1670.

One of the inventions of the Industrial Revolution which has a direct relationship to computers was developed in 1801. A Frenchman named Joseph Jacquard perfected the first punch card machine - a loom to weave intricate designs into cloth. It could weave flower designs or pictures of men and women as easily as other looms could weave plain cloth. A famous portrait of Jacquard himself was produced using 24,000 punched cards. When Jacquard first introduced his machine, he had difficulty gaining public acceptance because of the "fear of machines". In the city of Lyons, he was physically attacked and his machine was destroyed. Through Napoleon's support and the Paris World's Fair he sold a considerable number of his invention. What Jacquard did with his punched cards was, in essence, to provide an effective means of communicating with machines. The language was limited to two words: hole and no hole. The binary system is now universal in all modern day machines.

Charles Babbage is called the "Father of Computers". Babbage was an eccentric genius who inherited a sizeable fortune which he used to finance his wide range of interests. Babbage's contributions range from developing techniques for distributing the mail, to investigating volcanic phenomena, to breaking supposedly unbreakable codes. If Babbage had never thought about computers, he may have died a more happy man. But he, like the inventors before him, tried to free man from the slavery of computation with the invention of his difference engine. The speed of the engine is illustrated by the fact that if a mathematician was to write quickly, it was possible to keep up with the engine. But, when four figures were required, the machine may beat the writer. The machine had the advantage of being able to maintain its rate of computation for any length of time. Babbage applied to the British government for funds to build the machine. Upon receiving a government subsidy in 1823, he began work on his engine. By 1842 the English government had advanced him nearly $42,000. To most people who had just become accustomed to the power loom created by Jacquard, it was inconceivable that a machine could take over the work of the brain. Besides the government grant, Babbage spent $42,000 of his own money on the machine. As it turned out, the machine was never built because he kept changing the design. A Swedish gentleman finally built the machine in 1854 and displayed it in London. Babbage got an idea for his second machine, the analytical engine from watching a loom attachment invented by Jacquard. The analytical engine was designed to read two sets of material, store them, and do mathematical operations on them. The first set of material would be the operation or program, which was to be carried out on the second set of material, the variable or data. However, Babbage never completed the analytical engine nor had he progressed far enough for someone else to complete it. Lady Ada Lovelace, daughter of Lord Byron, became involved in the development of the analytical engine. Lady Lovelace not only helped Babbage with financial aid, but, being a good mathematician, wrote articles and programs for the proposed machine. Many have called her the first woman progammer. It seems that computers were already being used for playing games. While Babbage was working on an automated tic-tac-toe game, Lady Lovelace proposed that it might be used to compose music. Some 20 years later, Babbage authored a paper titled, "Some Questions Concerning the Game of Chance". As an extension, he and Lady Lovelace embarked on a plan to devise an infallible betting system at the horse races. At first they won, but as time passed they were less successful. Babbage lost most of his money, and Lady Lovelace lost such large sums that twice, in order to pay her debts, she had to pawn her jewels. Her mother, without the knowledge of Lord Byron, redeemed them for her.

Although Lady Lovelace thought the analytical engine would someday produce music, Babbage was not too fond of music, especially the sound of organ grinders. Besides thinking about machines, he spent much time in his fight against organ grinders. They were known to have seranaded below his window after midnight, and Babbage's epitaph on his grave resounds his dislike for them. The analytical engine was in some ways more complicated than today's computers. It worked by means of a system of gears and cogs; the electric engine having not been invented yet. The machine worked with the decimal system rather than the binary system that today's machines use. Even though Babbage never did complete his engine, the ideas he presented are said to have been the beginning of the computer revolution that freed white collar workers from mechanical intellectual labor, just as other machines freed blue collar workers from hard physical labor.

The taking of the U.S. census in 1890 provided a key opportunity for the next major step in the history of the digital computer. The 1860 census, covering a population of over 50 million, took seven years to tabulate. John Billings made a comment to Herman Hollerith, a nineteen year old engineer, that he felt that there ought to be some mechanical way of doing this job. Perhaps a way of using the principle of the Jacquard loom, where holes in the card regulate the pattern of weave. Hollerith went to work on this idea. The first machine he devised used paper strips with holes punched on them according to a code, similar to a player piano. The paper strip was found to be impractical, so in 1887 a punched card was devised. Hollerith worked out a system that a person's name, age, sex, and other relevant information could be coded by punching holes in a card. The size of the card (now called a Hollerith IBM card) was the size of the 1887 dollar bill. Not knowing what size to make the card, Hollerith pulled out a one dollar bill and traced it. The card was divided into 240 separate areas (20 rows of 12 punches).

The system eventually included the cards, a card punch, a pin press, electromagnetic counters, and a sorting box. After the cards were punched they were placed in the pin press and a hinged box was lowered manually to activate the counter and open the lid of a sorting slot. Cards were read at a speed of 50 - 80 per minute. Test tabulation showed the enumeration time was 3/4 and the tabulation time was 1/8 of that required by earlier systems. Despite the increased population to 63 million in 1890, the census was tabulated in 2 1/2 years, a job that might have taken 9 - 10 years manually. In 1896, Dr. Hollerith organized the TABULATING MACHINE COMPANY to promote the commercial use of his machine. Later, he developed a more accurate card handling device, but was unable to reach an agreement with the Census Bureau to do the 1910 census. He later merged his company with two others and it became International Business Machines (IBM). James Powers developed the punch card system used in the 1910 census. His machine increased both the speed and accuracy of punching. After the census, Powers also became convinced that there was a commercial market for his machines. In 1911, he formed Powers' Tabulating Machine Company and was the principle competitor of Hollerith. Through a series of mergers, his company became part of the Sperry Rand Corporation and the Sperry UNIVAC division. During the next 20 years no significant developments were recorded. World War II hastened the process because of the need for fast computation.

In 1937, Professor Howard Aiken of Harvard became interested in building an automatic calculating device. The Mark I, with the help of IBM engineers, was completed in 1944. The Mark I was 51 feet long, 8 feet high, contained 760,000 parts, used 500 miles of wire, and weighed 5 tons. Aiken's machine was built on the concept of using information from punched cards as input and making decisions through electromechanical devices (addition and subtraction took .3 of a second, multiplication less than 6 seconds and division less than 16 seconds), and produced results on punched cards.
Mark I is considered to be the first general purpose digital computer with all operations being carried out by a system of switches and relays. The machine was used extensively by the U.S. Navy during the Second World War. The first electronic digital computer was a secret wartime project developed at the University of Pennsylvania. It was originally designed to help the government with the calculation needed with the projectory of shells. The computer was finished in 1946 by Dr. John Mauchly and J. Presper Eckert and called ENIAC (Electronic Numerical Integrator and Calculator). Its

construction included 18,800 vacuum tubes. Two and one half years were needed just to solder the 500,000 connections the tubes required. The ENIAC weighed 30 tons and took up 1500 sq. ft. of floor space and required 1300 watts of power. ENIAC could perform 500 additions and 300 multiplications in one second, and in one day performed what would take 300 days to do by hand. Input and output was through punched cards. ENIAC, however, could only store 20 ten digit numbers. An interesting note is that in 1846, William Shanks had spent twenty years of his life computing to 707 decimal places. ENIAC computed to 2,000 in 70 hours and showed that Shanks made an error in the 528th decimal place.

In 1945, Dr. John von Neumann recommended that the binary system be used for storage in computers. He also proposed that instructions to control the computer, as well as data, be stored within the computer. The EDSAC (Electronic Delay Storage Automatic Calculator) was built at Cambridge University in 1949 and incorporated the above ideas. It was smaller in size, but greater in power than its predecessors. It occupied 140 sq. ft. and contained 5900 vacuum tubes. It could perform addition in 864 microseconds and multiplication in 2.9 milliseconds. The major difference in the EDSAC was its capability to store instruction and data. Previously, the control of the computer had been by removable plug wires and paper tapes and once the processing of data had started, no modifications, no matter how necessary, were possible. The UNIVAC I (UNIVersal Automatic Computer) manufactured by Sperry Rand was the first commercial computer. The UNIVAC was developed in 1951; previously, computers had been used for scientific and governmental use only. The UNIVAC I contained 500 vacuum tubes and could add in 2 microseconds and multiply in 10 microseconds.

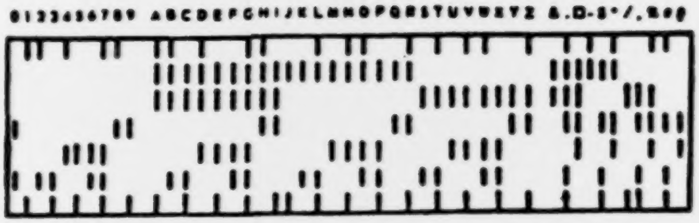
The computers discussed so far are what have been referred to as the First Generation of computers. Their characteristics were their massive size, which required air conditioning; their vacuum tubes; and the fact that they could only operate in machine language.

The Second Generation was built with transistors, which reduced the size of the computer. This generation used rings or cores for storage. The transistor was smaller, required less power, generated less heat, and was less expensive than the vacuum tube. Second Generation computers were made from 1959 through 1965. They are also characterized by being able to use the Fortran language to program.

The Third Generation of computers was introduced in 1965 and was characterized by the printed circuit. It is now possible to pack 100,000 components on one thin wafer. Third Generation computers are 900 times faster than First Generation computers. The 70 hours it took ENIAC to calculate 2,000 places could now be done in less than 5 minutes. Characteristics of Third Generation computers are that they are physically smaller, have greater reliability, operate with printed circuits, have the capability to "talk" with more than one user at the same time, are faster (operate in nanoseconds-billionth of a second), and can be programmed in more than one language. Whether we are in the "Fourth Generation" is still controversial. There is the basic question whether computers manufactured today are truly Fourth Generation or just more powerful and versatile than the Third Generation computer.

MAGNETIC TAPE

Magnetic tape is a very common storage device. It is a plastic tape coated with iron oxide which allows it to be magnetized. Each magnetized spot is called a bit and various combinations of bits are used to represent different characters. Magnetic tape is used as an input medium, an output medium and as auxiliary or secondary memory.



SOME CHARACTERISTICS:

1. Tape width: 1/2" (most common), 1/4" (cassette form), 3/4"
2. Tape length: 2400′ (most common)
3. Channels: 7 Track (6 bit code + parity bit)
   9 Track (8 bit code + parity bit)
4. Common densities: (character per inch) 200, 556, 800, 1600, 3200, and 6250
5. Tape drive speeds: (inches per second) 18 3/4, 39 1/2, 75, 112 1/2, 125, and 200
6. Read/Write speed: characters per second = (characters per inch) x (tape drive speed)

ADVANTAGES:

1. Large amounts of data can be stored on a tape.
2. Reels of tape are easily removed and stored until needed.
3. Tapes can be erased and reused.
4. Low cost (about $10 per tape).

DISADVANTAGES:

1. Data is stored sequentially and you must run tape from the beginning to the location of desired data.
2. Data cannot be read without processing tape through the computer system (unlike punched cards for example).
3. Difficult to insert new data between existing data.

OTHER FACTS:

1. Plastic file protection rings are often inserted in the center hole to prevent accidental writing on tapes.
2. Gaps are left between records of data to allow the tape drive time to stop or speed up.
3. Seven Bibles can be recorded on a single 2400 foot roll of magnetic tape at 1600 cpi.
4. One tape is equivalent to about 400,000 punched cards.

CLASSROOM ACTIVITY

DEVELOPING MAGNETIC TAPE

1. Remove the tape leader and about 5 feet of tape.
2. Cut off a strip about 6" long.
3. Tape it to a piece of paper (dull side up).
4. Shake developer well and coat the tape while holding it in an inclined position.
5. As the developer evaporates; the iron dust will cling to the magnetized spots.
6. To save the developed pattern, place scotch tape over the magnetic tape, remove and put the scotch tape on plain white paper.

MAGNETIC DISK

A magnetic disk is very similar to a phonograph record with several hundred concentric tracks. Each surface is metal with an iron oxide coating which can be magnetized in a manner similar to that of magnetic tape. However, the coded spots are nearly microscopic in size. Each surface is divided into sectors to aid in finding information quickly. It is used for input, output and auxiliary (secondary) storage.

Disks are usually assembled into stacks on a vertical shaft and spaced about 1/4" apart. These "disk-packs" rotate at high speed (2400-3600 rpm) and each surface has its own "read-write" head which moves directly to the desired location of stored data. Some common disk-packs have 6 disks (10 surfaces for recording and 2, the top and bottom surfaces, are not used) while others have 11 disks (20 surfaces for recording). While not in use, these disk packs are kept in a plastic case to prevent damage and dust pollution.

While more expensive than magnetic tape, ($75 - $3000 per disk pack) magnetic disks provide "random access." That is, information can be found directly instead of sequentially. This can be exemplified by a typical phonograph record. You can simply place the needle to play any song on the record. Thus, information can be found much faster than it could be on magnetic tape. Also, disk packs are capable of storing millions of characters.

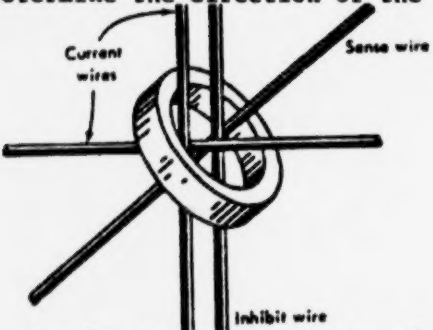
1.0.1

CLASSROOM ACTIVITY

1. Shake developer well.
2. Hold disk on an incline and spread the developer over the surface.
3. Note the tracks which appear.
4. Also note the "sectors" which are pie shaped regions on the surface.
5. Look at the disk under a microscope using high intensity light.

MAGNETIC CORE MEMORY

Until recently, magnetic cores were the principle type of internal or main memory. These cores are now being replaced by micro-miniature memory chips. Each core is a ferromagnetic, doughnut-shaped ring about the size of a pin head. The cores are hand strung into a plane with wires passing through the cores. These wires carry current which can magnetize the core in a clockwise or counter clockwise direction. A "sense" wire also passes through the core to determine the direction of the magnetic field.



Because the core can be magnetized in one of two directions, it can represent a "0" or "1". Then, using a binary coding system, a series of cores (bits) can be used to store a single character or word. To accomplish this, several core planes are stacked on top of one another and each vertical column of cores is used to represent a computer "word." For example, if a computer uses a 32-bit word, it must have 32 core planes in a vertical stack. Some common sizes are 8, 16 and 32 bit words.

CLASSROOM ACTIVITY

Examine the magnetic core plane using a low power microscope.

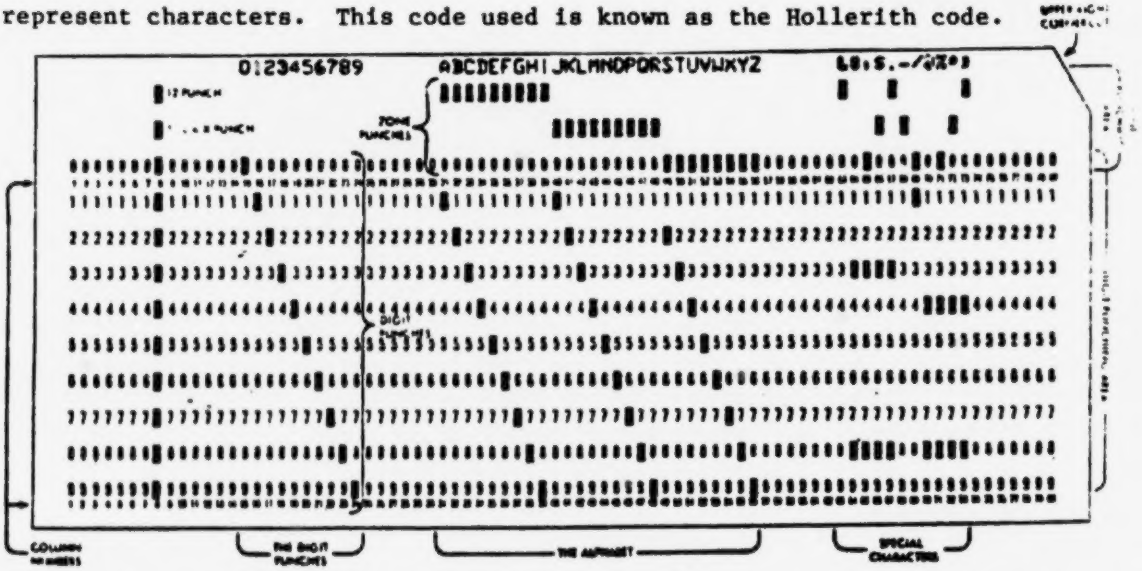
a. Can you count the cores on a single plane?

b. Note the wires for carrying current and sensing the direction of magnetism.

PUNCHED CARDS

Punched cards were originally developed in Europe during the 18th and 19th centuries to control weaving looms. In 1887, Herman Hollerith used a punched card to represent data and in 1890 the U.S. Census was done using his punched card.

Many types of cards now exist. The most common type is the IBM 80-column card. It measures 3 1/4" x 7 3/8" and has 12 punching positions in each of its 80 columns. One or more punches in a column are used to represent characters. This code used is known as the Hollerith code.


0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ
12 PUNCH
ZONE PUNCHES
DIGIT PUNCHES
COLUMN NUMBERS
THE DIGIT PUNCHES
THE ALPHABET
SPECIAL CHARACTERS

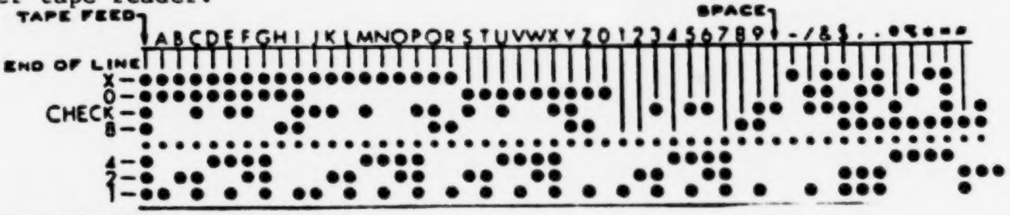
Other types of cards include the IBM 96-column short card, the UNIVAC 90-column card, marked sense cards, microfilm cards and perforated cards.

CLASSROOM ACTIVITY

1. Try to obtain some unused cards from a business and have students "pencil" in their name using the Hollerith code.
2. Have students bring in punched cards and decode them.

PAPER TAPE

Paper tape was originally developed for sending telegraph messages. It is produced by a paper tape punch. It is then used by running it through a paper tape reader.


TAPE FEED
SPACE
ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
END OF LINE
X
0
CHECK
8
4
2
1

CHARACTERISTICS

1. Width: 1/2" or 1"
2. Channels: 5 channel and 8 channel (most common)
3. Density: 10 cpi
4. Speed: 10-150 cps
5. Code: ASCII (a 7 position code)

ADVANTAGES

1. Length not restricted like a punched card is.
2. Very inexpensive.
3. Paper tape reader and punch is very compact.

DISADVANTAGES

1. Hard to correct errors.
2. Easily torn.

CLASSROOM ACTIVITY

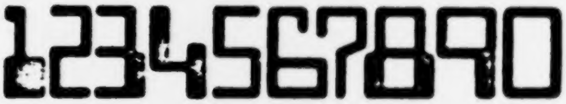
1. Obtain some punched paper tape and examine it.
2. If you have a paper tape punch, type a short message and have students decode the message using a chart like the one above.

1.0.1

MAGNETIC INK CHARACTERS

These special characters, readable to both humans and machines, are printed using a special magnetic ink. The device used to read these characters, the Magnetic Character Reader-Sort, can sense and read them electronically.

These characters are often found on business forms such as check blanks and credit card slips.



C L A S S R O O M   A C T I V I T Y

1. Examine a check blank or other form with magnetic ink characters.
2. Examine a credit card slip.

⑆	TRANSIT SYMBOL
⑈	"ON-US" SYMBOL
⑉	DASH SYMBOL
⑇	AMOUNT SYMBOL

SPECIAL SYMBOLS

MICROFILM

Microfilm is often produced by a device known as a Computer Output Microfilmer (COM). It is capable of transferring information from magnetic tape onto microfilm at a rate of 120,000 characters per second. The resulting output may be a roll of microfilm or a 4" x 6" sheet known as a microfiche or "fiche."

Microfilm takes up about 2 percent of the space paper forms would take up and it is very easy to file and retrieve. It is very low in cost and easy to convert to a readable paper copy. It is sometimes stored on a punched card (called an aperature or microfilm card) so it can be retrieved by a computer controlled retrieval system.

Microfilm can be easily viewed using a special projection system called a reader. The microfiche usually has an index in the lower right corner and the rolls have an index at the beginning.

Microfilm is often used by libraries to store back issues of various publications and by businesses to store reports, documents and mailing lists.

CLASSROOM ACTIVITY

1. Use a low power microscope to examine the "fiche".

TELETYPE OUTPUT

Teletype output is produced by a typewriter at a speed of 10-200 characters per second. The line width is generally 72 characters.

LINE PRINTER OUTPUT

Line printers can produce output at a rate of 300-2000 lines per minute. Most line printers have 132 character line. Some line printers operate by striking an entire line on inked ribbon, while others do it electronically using special paper.

PLOTTER OUTPUT

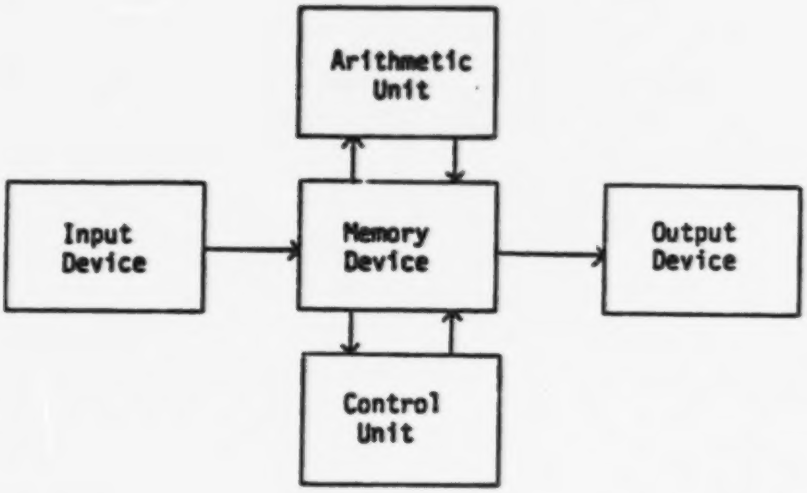
Plotters are a relatively new device being used to do graphic projects such as weather maps, contour maps, statistical graphs, artwork, blueprints and circuit design.

Plotter output comes in various widths up to 36" and their speed ranges from 10 cps to 5000 lpm.

1.0.1

A COMPUTER SYSTEM IN DIAGRAM

Unit



Device	Input	Output	Memory	Med. Used
1. Audio Response Unit		X		Recorded sound
2. Bubble Memory			X	Magnetic bubble
3. Card Punch		X		Punched card
4. Card Reader	X			Punched card
5. Computer Output Microfilmer		X		Microfilm
6. CRT Display	X	X		CRT screen
7. Data Cell Drive			X	Magnetic Strip
8. Digital Plotter		X		Paper
9. Laser Memory			X	Hologram
10. Line Printer		X		Paper
11. LSI Memory			X	Integ. circuits
12. Magnetic Card Unit			X	Magnetic card
13. Magnetic Core Unit			X	Magnetic core
14. Magnetic Disk Unit	X	X	X	Magnetic disk
15. Magnetic Drum Unit			X	Magnetic drum
16. Magnetic Tape Unit	X	X	X	Magnetic tape
17. MICR Reader	X			Paper
18. Optical Character Reader	X			Paper
19. Optical Scanner	X			Paper
20. Page Printer		X		Paper
21. Paper Tape Punch		X		Paper tape
22. Paper Tape Reader	X			Paper tape
23. Typewriter (TTY)	X	X		Paper

1.0.1

COMPUTER GENERATIONS

1ST. GENERATION

This generation of computers is usually dated from 1946 to 1959. The main electronic device used was the vacuum tube. In comparison to today's computer, these computers were large, slow (39,000 additions per second), and had frequent failures due to tubes burning out. For example, ENIAC (1946) had 19,000 vacuum tubes, weighed 30 tons and took up 1500 sq. ft. It has been estimated that it costs $1.25 per 100,000 computations with a first generation computer.

2ND. GENERATION

The transistor (invented by Bell Telephone in 1948) eventually replaced the vacuum tube. The first commercial computer using this "solid-state" technology was introduced by IBM in 1959. Most computers used this device until 1964. Transistors were much smaller than vacuum tubes, more reliable, faster (200,000 additions per second) and they produced very little heat. It has been estimated that every 100,000 computations cost about 25 cents.

3RD. GENERATION

In 1964, IBM again introduced an even smaller, faster (1,250,000 additions per second), and more reliable device--the integrated circuit. These circuits, often called "chips" or "IC's", contained hundred and some even thousands of electronic devices while taking up less space than a transistor. The cost per 100,000 computations was now as low as 10 cents!

TODAY

Many claim we are now in a fourth generation. Computers now use a device referred to as an LSI (large scale integration). These devices contain thousands of transistor like circuits and are extremely fast (10,000,000 additions per second). Some 1/4" LSI chips contain as many as 1,000 complete circuits! These monolithic devices can do 100,000 computations for less than 1 cent. For a very complete and comprehensive report, see Scientific American, September, 1977.

CLASSROOM ACTIVITIES

Locate examples of vacuum tubes, transistors, and integrated circuits.

1. Point out these devices to your students. If you are not familiar with them, consult with your electronics teacher or a student interested in electronics.
2. Remove the top from an integrated circuit "chip." This will expose the actual chip.

MISCELLANEOUS CLASS ACTIVITIES AND IDEAS

1. Have students prepare a scrapbook on computers. Have them include news articles, advertisements, input/output samples, list of businesses in town using computers, drawings, etc.

2. Have students conduct an interview with a friend or relative who works with computers. These interviews can provide you a list of possible guest speakers.

3. If you have only one computer, it works well to explain the sign on procedure to all students and then have each student, after signing on, teach another how to do it.

4. If you have a large class and only 1 or 2 computers, you can divide your class into small groups. Then, plan as many activities as you have groups and rotate groups until all have completed the planned activities. Examples of activities: on the computer, writing programs; debugging programs; computer career reports; listening to taped lectures; computer related readings; making computer scrapbook; textbook lessons; etc. (Thus, if you have 5 groups, choose activities and in 5 days all students will have covered the desired activities.)

5. Have students interview someone concerning their ideas and attitudes about computers. The results are often times interesting!

6. Have a computer poster contest to arouse interest or promote research on various computer topics.

7. Set up panels or debate teams to explore topics such as data banks, computer privacy, computerized society, unemployment due to the computer, computer for a teacher, etc.

8. Demonstrate the use of your computer during school open houses, at a local store or at a PTA meeting. Students enjoy "showing off" their skills and much public interest is generated.

9. Many companies offer free or inexpensive computer related items. They include brochures, films and posters. They are well worth writing for to help increase your collection of "computer stuff".

10. Have programming contests among your students. Give them a challenging problem and offer recognition for the first one done, best formatting, most efficient (least lines to do the job), etc.

11. Form a computer club with interested students. Activities can include guest speakers, learning new languages, building a mini-computer, touring various computer facilities, demonstrating your computer to local groups, etc.

DATES OF IMPORTANT EVENTS IN COMPUTING

1643 - Blaise Pascal: Calculator (+ and -)

1671 - Leibnitz: Calculator (x and)

1801 - Jacquard: Weaving loom using punched cards

1822 - Charles Babbage: Difference Engine

1833 - Charles Babbage: Analytical Engine (Prototype of Modern Computer)

1887 - Herman Hollerith: Punched card tabulating machines

1890 - U.S. Census done with punched cards

1907 - James Powers: Another punched card tabulating machine

1944 - Howard Aiken: MARK I (Automatic Sequence Controlled Calculator)

1946 - Mauchly and Eckert: ENIAC, first all electronic computer

1949 - John von Newman: EDVAC, first computer using "stored program"

1951 - Mauchly and Eckert: UNIVAC 1, first commercial computer (48 built)

1959 - IBM Model IBM 7090: Offered transistorized computers
(2nd. generation)

1964 - IBM System/360: First computer with microminiature circuits
(3rd. generation)

GUIDE TO ABBREVIATIONS

ACM - Association for Computing Machinery
ACPA - Association of Computer Programmers and Analysts
ADP - Automatic Data Processing
AI - Artifical Intelligence
ALGOL - Algorithmic Oriented Language
APL - A Programming Language
ARP - Audio Response Unit
ASCII - American Standard Code for Information Interchange
BAL - Basic Assembly Language
BASIC - Beginner's All-Purpose Symbolic Instruction Code
BCD - Binary Coded Decimal
BIT - Binary Digit
BOS - Basic Operating System
bpi - bits per inch
bps - bits per second
CAD - Computer Assisted Design
CDC - Control Data Corporation
COBOL - Common Business Oriented Language
COM - Computer Output Micro-Filmer
cpi - characters per inch
cpm - characters per minute
cps - characters per second
CPU - Central Processing Unit
CR - Carriage Return
CRAM - Card Random Access Memory
CRT - Cathode Ray Tube
DASF - Direct Access Storage Facility
DASD - Direct Access Storage Device
DEC - Digital Equipment Corporation
DMA - Direct Memory Access
DOS - Disk Operating System
DP - Data Processing
DPMA - Data Processing Management Association
EBCDIC - Extended Binary Coded Decimal Interchange Code
EDP - Electronic Data Processing
EDSAC - Electronic Delay Storage Automatic Calculator
EDVAC - Electronic Discrete Variable Automatic Computer
ENIAC - Electronic Numerical Integrator and Calculator
EOF - End of File
EOT - End of Tape or End of Transmission
FDX - Full Duplex
FIFO - First In, First Out
FORTRAN - Formula Translation
GIGO - Garbage In, Garbage Out
HDX - Half Duplex
HP - Hewlett-Packard Company
IBM - International Business Machines
IC - Integrated Circuit
I/O - Input/Output

IOCS - Input/Output Control System
IOM - Input/Output Multiplexer
LED - Light Emitting Diode
lpm - lines per minute
LSI - Large Scale Integration
MICR - Magnetic Ink Character Recognition
MIS - Management Information System
MST - Monolithic Systems Technology
NCR - National Cash Register Company
OCR - Optical Character Recognition
OS - Operating System
PC - Printed Circuit
PET - Personal Electronic Transactor
PL/I - Programming Language I
PROM - Programmable Read Only Memory
RAM - Random Access Memory
RCA - Radio Corporation of America
ROM - Read-Only-Memory
RPG - Report Program Generator
SDE - Society of Data Educators
3M - Minnesota Mining and Manufacturing
TOS - Tape Operating System
TRS - Tandy Radio Shack
TTY - Teletype
UNIVAC - Universal Automatic Computer
UPC - Universal Product Code
VDT - Video Display Terminal
WP - Word Processing

1.1.1
Reference No.

ACTIVITY TITLE: What 's The Scoop?

OBJECTIVE: The student will describe the contributions of various people to computing.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Have each student be a newspaper reporter covering an important event in computing history. Write an article about this event or person and possibly compile a computer newspaper.

EXTENSION: Place in the room a large timeline. As students finish their article, have them attach it to the timeline at the appropriate place.

EXTENSION: This can be used as a composition activity in conjunction with a word processor program.

MATERIALS REQUIRED: Paper
Pencil
Research material

ADDITIONAL RESOURCES: See Historical Resources Unit 1.0.1.

See also Timeline Sheet 1.2.4.

1.1.2
Reference No.

ACTIVITY TITLE: Hall Of Fame

OBJECTIVE: The student will describe the contributions of various people to computing.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Prepare a bulletin board on a "Computer Hall of Fame." Include pictures or drawings and paragraphs about famous people and events in computing history.

EXTENSION: Students can attach these pictures, articles and drawings to a timeline displayed in the room (see extension on activity 1.1.1).

MATERIALS REQUIRED: Construction paper
Markers
Glue
Tape
Pictures

ADDITIONAL RESOURCES: See Historical Resources Unit 1.0.1.

1.1.3
Reference No.

ACTIVITY TITLE: Jacquard's Loom

OBJECTIVE: The student will describe the contributions of various people to computing.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	

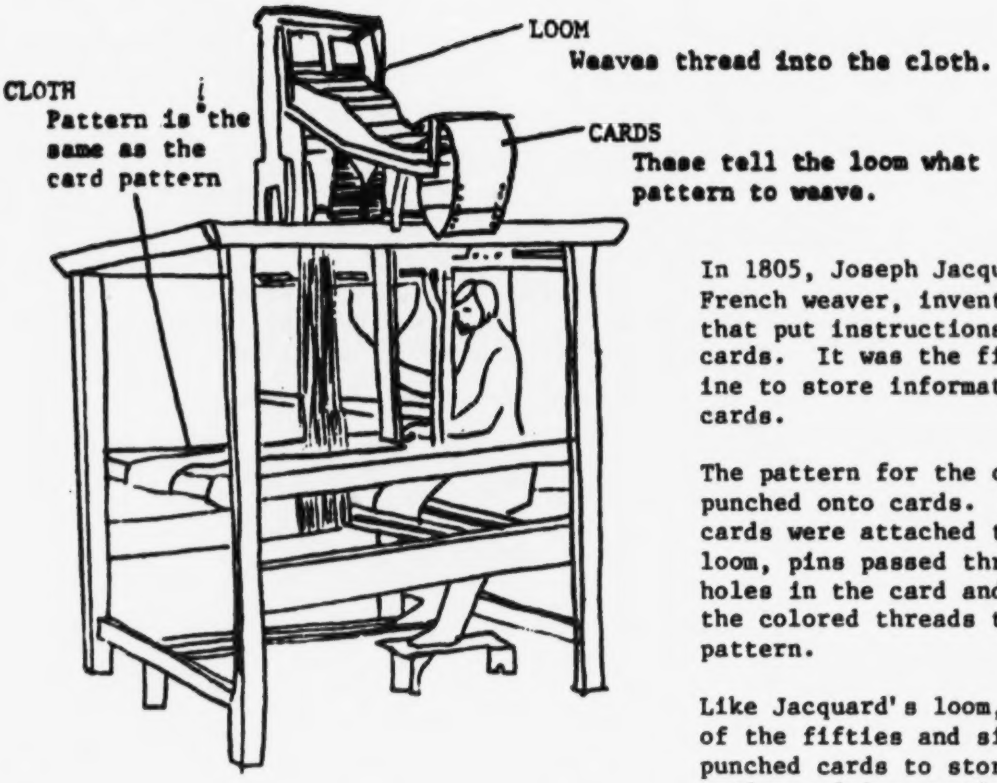
DESCRIPTION: This is to be used as a reinforcement activity after a historical film or slide presentation is given. See resources for listing of AV materials. The activity describes Joseph Jacquard's contribution to computing.

MATERIALS REQUIRED: Duplicated student sheets

ADDITIONAL RESOURCES: See Historical Resource Unit 1.0.1.

Related activity 1.1.5.

JACQUARD'S LOOM


LOOM
Weaves thread into the cloth.
CLOTH
Pattern is the same as the card pattern
CARDS
These tell the loom what pattern to weave.

In 1805, Joseph Jacquard, A French weaver, invented a loom that put instructions on punch cards. It was the first machine to store information on cards.

The pattern for the cloth was punched onto cards. When the cards were attached to the loom, pins passed through the holes in the card and chose the colored threads to fit the pattern.

Like Jacquard's loom, computers of the fifties and sixties used punched cards to store information and instructions.

QUESTIONS

1. How did punched cards make the weaver's job easier?
2. Why might some weaver's be against using Jacquard's loom?
3. How would you change the pattern for the cloth on this loom?
4. Which would cost more, a hand-woven scarf or one produced on Jacquard's loom? Why?
5. Why are stored instructions important?
6. List examples of modern devices that store information.

1.1.4
Reference No.

ACTIVITY TITLE: Who's Who In Computer History?

OBJECTIVE: The student will describe the contributions of various people to computing.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: This activity is a True-False Quiz which can be used as a pre-test, a discussion generator or to present historical information.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: See Historical Resources Unit 1.0.1

Key to activity:

1. F
2. T
3. F
4. F
5. F
6. T
7. T
8. F
9. T
10. T

WHO'S WHO IN COMPUTER HISTORY

How much do you know about people involved in the history of computers? Test yourself by answering true or false to these questions.

T F 1. One of the first aids to computation, the abacus, was invented nearly a thousand years ago by the Chinese.

T F 2. Punched cards were used in the Jacquard Loom to help automate the weaving of cloth during the early 1800's.

T F 3. Blaise Pascal invented a computer language called Pascal.

T F 4. Punched cards were used by Herman Hollerith to process the United States census of 1776.

T F 5. Charles Babbage is noted primarily for building the first hand-held electronic calculator.

T F 6. Lady Lovelace, an associate of Charles Babbage, is sometimes called the first programmer.

T F 7. Grace Hopper of the United States Navy is credited with developing COBOL.

T F 8. Napier developed the analytical engine.

T F 9. Leibnitze invented the Leibnize Wheel which could do all four mathematical operations.

T F 10. Professors Mauchly and Eckert developed ENIAC in 1946.

1.1.5
Reference No.

ACTIVITY TITLE: Punched Cards

OBJECTIVE: The student will describe the contributions of various people to computing.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: The students create and use punched cards similar to those of Joseph Jacquard and Herman Hollerith.

MATERIALS REQUIRED: Student activity worksheet
Hole punch
Scissors
Knitting needle

ADDITIONAL RESOURCES:

1.1.5

PUNCHED CARDS

I. Learn about your classmates

A. Print name on card.

B. Punch out each hole. Do not cut edge of sheet.

C. Answer each question. If "yes" cut open the "no" hole. If "no", cut open the "yes" hole.

1. Are you a girl?
2. Is your hair blond?
3. Do you like "Rush" or some other music group?
4. Are your eyes blue?
5. Are you wearing jeans?
6. Do you wear glasses?

D. Stack the cards with names up. Put needle through the "no" hole for question one. Shake stack gently. The cards hooked on the needle belong to the boys.

E. Using the cards on the needle, continue in like manner for any question. For example, putting needle through the "no" hole on question 4 would produce cards of boys without blue eyes.

F. Use this method to determine the girls who wear glasses.

II. What are your interests?

A. Repeat steps A and B above.

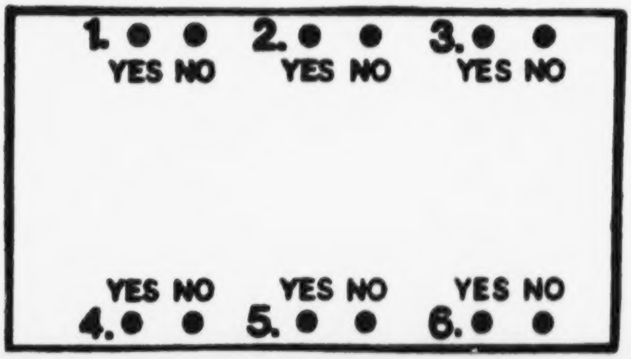
C. Answer each question. If "yes" cut open the "no" hole. If "no" cut open the "yes" hole.

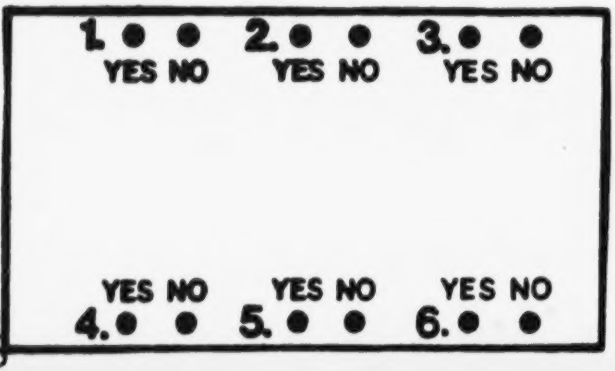
1. Are you a boy?
2. Do you ski?
3. Do you own a bike?
4. Do you play basketball?
5. Do you play a musical instrument?
6. Do you enjoy art?

D. Find all girls who enjoy art.

E. Find all boys who ski and enjoy art?

Duplicate and use the following patterns for your cards.





1.2.1
Reference No.

ACTIVITY TITLE: Computer History Preview

OBJECTIVE: The student will describe the contributions of various people to computing.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: A multiple choice preview of historical computing events. This could be used to present information or review information.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: See Historical Unit 1.0.1.

Key: "Digital Computers"

1.2.1

COMPUTER HISTORY PREVIEW

What Do You Call People Who Count on Their Fingers?

" ___ ___ ___ ___ ___ ___ ___   ___ ___ ___ ___ ___ ___ ___ ___ ___ "
14 1 9 1 2 8 13   12 7 3 11 4 2 10 5 6

To find out, complete each statement by circling one of the two responses following it. Then match the letter in your response with each statement number and fill in the blanks below.

___ 1. The first electronic computer used. H - transistors
I - vacuum tubes

___ 2. The first mechanical aid to computer was the S - slide rule
T - abacus

___ 3. Which of these was invented earlier? M - television
N - electronic computer

___ 4. The person who used punched cards in the 1890 census was U - Hollerith
I - Jacquard

___ 5. The first general purpose electronic digital computer was built in the U.S. during R - World War II
M - Space Program

___ 6. The first electronic digital computer was called S - ENIAC
T - UNIVAC I

___ 7. A mathematician who also built a mechanical calculator was O - Pascal
A - Descartes

___ 8. The first mechanical calculators were mainly used by A - scientists
E - math students

___ 9. The "relay" computer that used telephone circuitry was slower than those termed J - mechanical
G - electronic

___10. Major problems occurred with the first electronic computer because of its I - excessive cost
E - vacuum tubes

___11. The largest computer company in the world is P - IBM
Q - Sperry-Rand

___12. One common type of primary storage for modern computers consists of magnetic D - tape drives
C - core units

___13. Transistors in computers have replaced the use of M - punched cards
L - vacuum tubes

___14. Calculators have become cheaper because of an invention called B - magnetic cards
D - chips

Used by Permission of dilithium Press.
From: Are You Computer Literate?, page 37 and 38.

1.2.2
Reference No.

ACTIVITY TITLE: Computing Events

OBJECTIVE: The student will develop a timeline of major computing events.

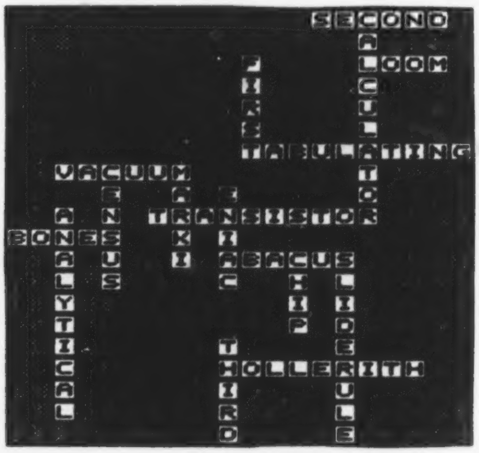
GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: A crossword puzzle which will develop familiarity with historical computer events.

MATERIALS REQUIRED: "Computing Events" Crossword Puzzle

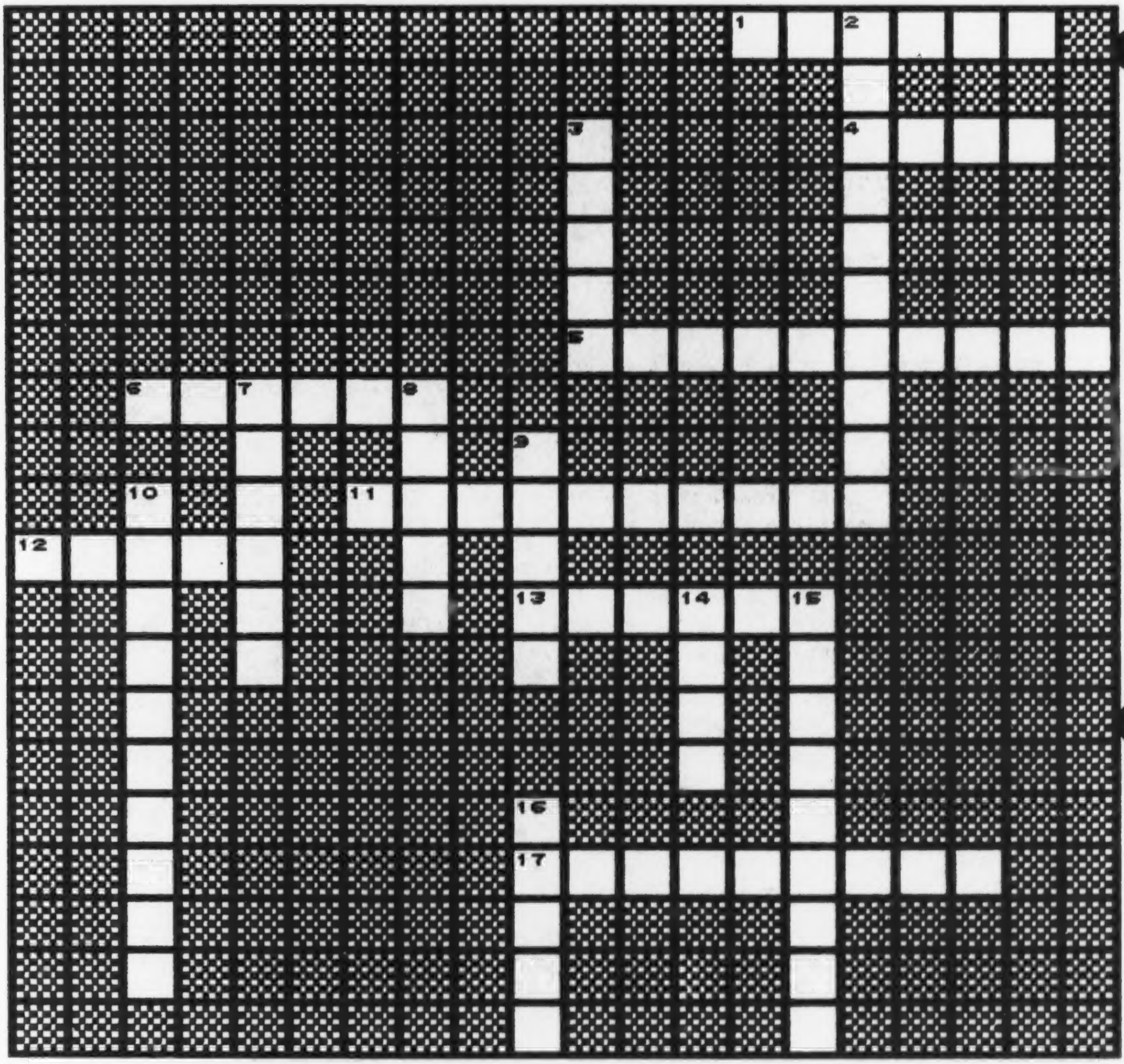
ADDITIONAL RESOURCES:

Answer: Computing Events


SECOND
CALCULATOR
LOOM
FIRST
TABULATING
VACUUM
CENSUS
MARK I
ENIAC
ANALYTICAL
TRANSISTOR
BONES
ABACUS
CHIP
SLIDE RULE
THIRD
HOLLERITH

From: Crossword Magic
L & S Computerware
1589 Fraser Drive
Sunnyvale CA 94087

COMPUTING EVENTS



ACROSS CLUES

1. ______ COMPUTER GENERATION USED TRANSISTORS
4. JACQUARD FIRST USED PUNCH CARDS TO OPERATE THIS
5. __________ MACHINE COMPANY BECAME IBM
6. ______ TUBES WERE USED BY FIRST GENERATION COMPUTERS
11. USED BY SECOND COMPUTER GENERATION
12. CALCULATING DEVICE DEVELOPED BY JOHN NAPIER
13. EARLY COUNTING DEVICE
17. DEVELOPED COMPUTER PUNCH CARDS

DOWN CLUES

2. DEVICE FOR PERFORMING MATHEMATICAL CALCULATIONS
3. _____ COMPUTER GENERATION USED VACUUM TUBES
7. IN 1890 STIMULATED EARLY DEVELOPMENT OF COMPUTERS
8. FIRST GENERAL PURPOSE DIGITAL COMPUTER (1944)
9. COMPUTER BUILT IN 1946 USING 18,800 VACUUM TUBES
10. __________ ENGINE DEVELOPED B BABBAGE IN MID-1800'S
14. PIECE OF SILICON CONTAINING AN INTEGRATED CIRCUIT
15. CALCULATING DEVICE INVENTED IN 1630
16. _____ COMPUTER GENERATION USED INTEGRATED CIRCUITS (1965)

1.2.3
Reference No.

ACTIVITY TITLE: Computer Scramble

OBJECTIVE: The student will develop a timeline of major computing devices.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*		

DESCRIPTION: Provided with a list of scrambled computer related words, students will unscramble into correct words.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

Answer key:

1. BASIC
2. HOLLERITH
3. PROCESSING
4. VACUUM
5. TRANSISTOR
6. BINARY
7. CALCULATOR
8. PASCAL
9. BABBAGE
10. ABACUS
11. JACQUARD
12. ELECTRONIC
13. MATHEMATICS
14. BONES
15. COMPUTER
16. CHIP
17. MEMORY
18. DIGITAL
19. GENERATIONS
20. MICROCOMPUTER
21. SILICON
22. UNIVAC
23. ENIAC
24. CENSUS
25. CIRCUIT

1.2.3

COMPUTER SCRAMBLE

NAME ______________________________ DATE ______________________

1. ACSBI ______________________
2. EHRTHOLIL ______________________
3. IESGCPSONR ______________________
4. VUAUCM ______________________
5. ATSTISONRR ______________________
6. NIYRAB ______________________
7. LAUACLCTOR ______________________
8. AASCLP ______________________
9. GEABBBA ________________
10. AAUBSC ________________
11. RQAJAUCD ________________
12. ILTEECORCN ______________________
13. IETHATSMAMC __________________________
14. SNOBE ______________
15. RCPOETUM ________________
16. HIPC ____________
17. ORYEMM ______________
18. LDITGAI ________________
19. ANNTEIESORG __________________________
20. CIPMETRCORMUO ____________________
21. SLONCII ________________
22. NAVIUC ______________
23. ECNAI ______________
24. SCSENU ______________
25. RUITCCI ____________

1.2.4
Reference No.

ACTIVITY TITLE: Timeline

OBJECTIVE: The student will develop a timeline of major computing events.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

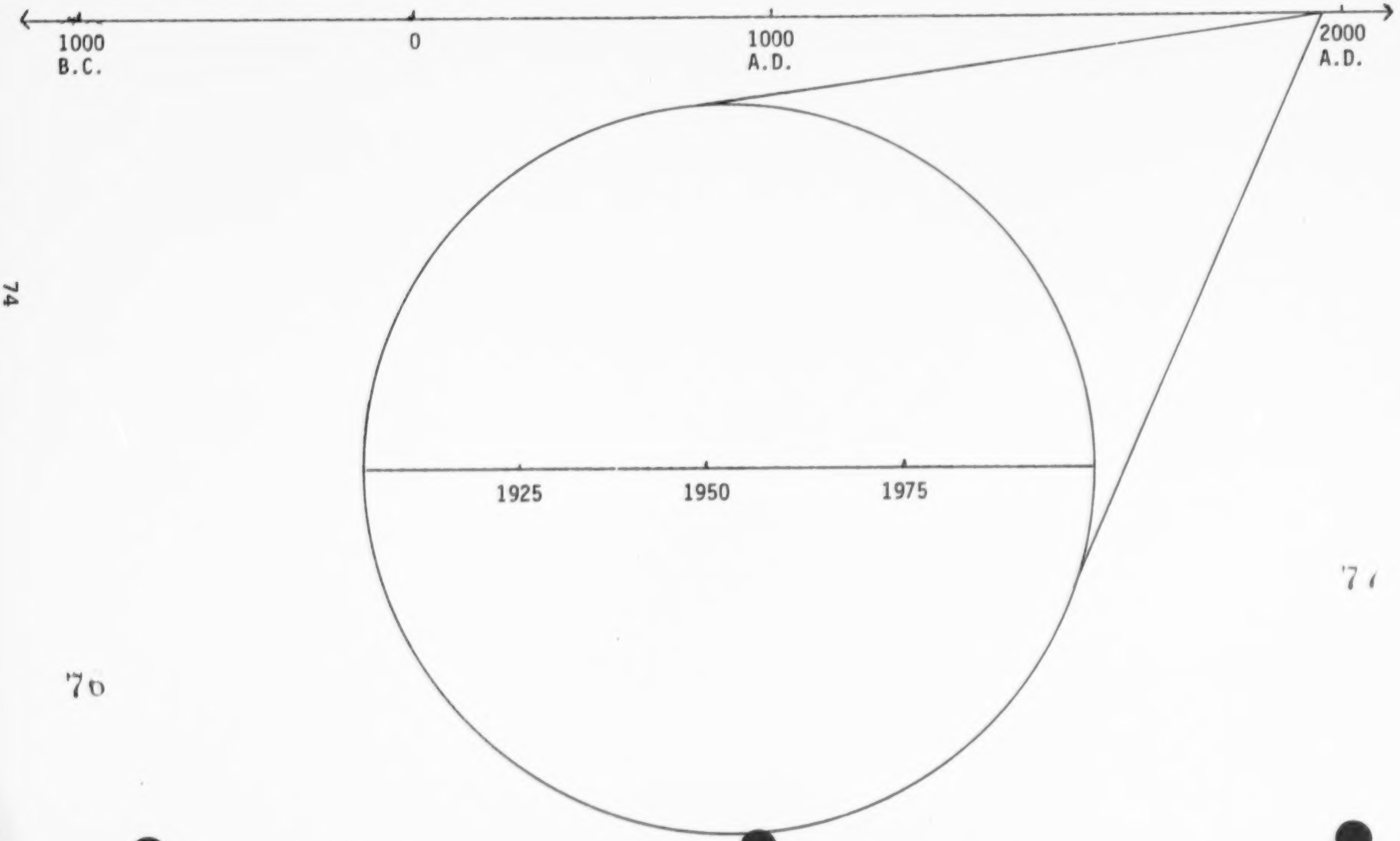
DESCRIPTION: Using the example timeline as a reference, trace the major developments in computing devices. Depending on the grade level, this may be a chalkboard or individual activity. Another activity could be to extend this timeline and project what the next developments might be.

MATERIALS REQUIRED: Sample timeline (for teacher)

ADDITIONAL RESOURCES: From: Pebbles to Programs (filmstrip).

Computer Discovery, software published by SRA, "Timeline" section.

TIMELINE OF COMPUTER DEVELOPMENT


1000
B.C.
0
1000
A.D.
2000
A.D.
1925
1950
1975

1.3.1
Reference No.

ACTIVITY TITLE: Early Counting Systems

OBJECTIVE: The student will describe the historical methods used for storing information prior to electronic computers.

GRADE LEVELS:	. K-3	4-6	7-8	9-12
	*	*		

DESCRIPTION: Using the paragraph below, students will develp their own number storage system.

> Gronk was a caveman who was faced with an awful problem. He was counting his dinosaur cows one day using his fingers and toes. When he reached 20, he hadn't counted them all and he realized that a new baby dinosaur cow had been born during the night. He puzzled for a long while about how to keep track of his growing herd.
>
> Help Gronk out! What ideas could you give Gronk to help him keep track of his dinosaur cows?

Teacher's Note: Early counting systems might have included:

fingers and toes
notches on a stick
scratches in the dirt
charcoal marks on the wall
rocks in a pocket
knots on a rope
on an abacus
with a numeration system

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

1.3.2
Reference No.

ACTIVITY TITLE: Place Value And Bases

OBJECTIVE: The student will describe the historical methods used for storing information prior to electronic computers.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: The students will order 20 numbers in the Roman Numeration System and then in our present system and compare how long it takes them to do each. Discuss which system was ordered faster and why. The discussion should include the advantages of a place value system.

EXTENSION: Use a computer sort program and compare the speed of the computer with the students' speed. A sample sort program is included below.

```
5     DIM A(20)
10    PRINT "I WILL DEMONSTRATE HOW QUICKLY I CAN "
20    PRINT "ARRANGE THE SAME TWENTY NUMBERS YOU HAVE"
30    PRINT "IN ORDER.  I AM GETTING THE NUMBERS"
40    PRINT "IN MY MEMORY."
50    FOR I = 1 TO 20
60    READ A(I)
70    NEXT I
80    DATA 832,13260,17,3, 1417,16,347,62,6,1462531,142,500,24,21,345,242
      10452,45,50,78
90    PRINT "THESE ARE THE NUMBERS."
100   FOR I = 1 TO 20
110   PRINT A(I)
120   NEXT I
130   PRINT "WHEN YOU WANT ME TO BEGIN, PRESS ANY KEY"
140   GET Z$
145   PRINT "I'M WORKING"
150   FOR X = 1 TO 19
160   FOR Y = X + 1 TO 20
170   IF A(X)  = A(Y) THEN 210
189   LET T = A(X)
190   LET A(X) = A(Y)
200   LET A(Y) = T
210   NEXT Y
220   NEXT X
230   PRINT "HERE ARE THE NUMBERS IN ORDER.": PRINT : PRINT
250   FOR I = 1 TO 20
260   PRINT A(I),
270   NEXT I
280   END
```

MATERIALS REQUIRED: Student sheets duplicated, clock or stop watch

MATERIALS FOR EXTENSION: Computer, disk with sort routine entered on it

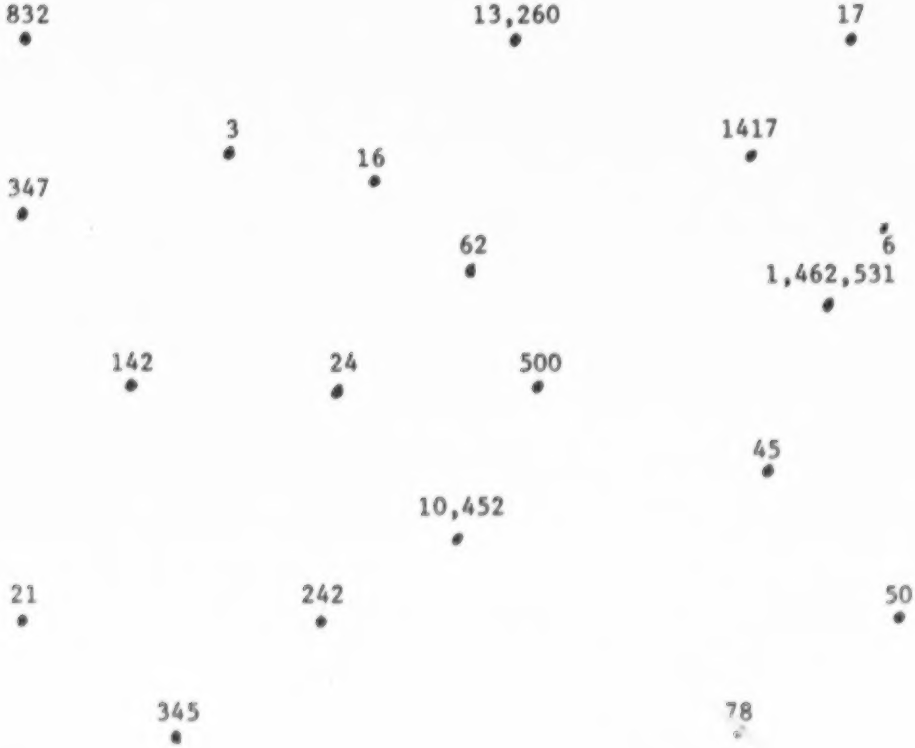
ADDITIONAL RESOURCES:

1.3.2

PLACE VALUE AND BASES

Directions: You are going to see how fast you can order 20 numbers by drawing a line from the smallest number to the next smallest, etc. When through, find out how long it took you.

Starting Time____ Finishing Time_________ Total Time_________


832
13,260
17
3
1417
16
347
62
6
1,462,531
142
24
500
45
10,452
21
242
50
345
78

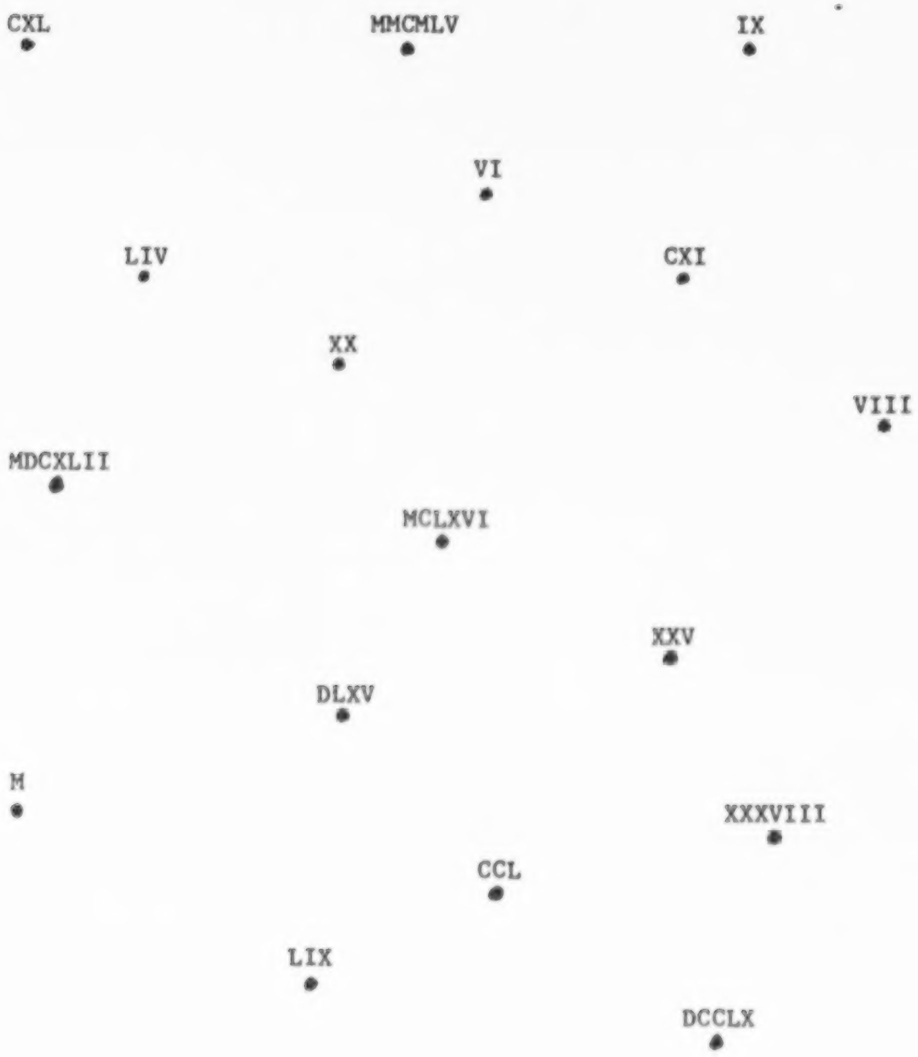
From: What to do Until the Computer Comes by Allan Dunn.

1.3.2

PLACE VALUE AND BASES

Directions: Now time yourself as before, except now there will be Roman Numerals.

Starting Time_____ Finishing Time_____ Total Time______


CXL
MMCMLV
IX
XI
VI
LIV
CXI
XX
VIII
MDCXLII
MCLXVI
IV
XXV
DLXV
M
XXXVIII
CCL
LIX
DCCLX

From: What to do Until the Computer Comes By Allan Dunn.

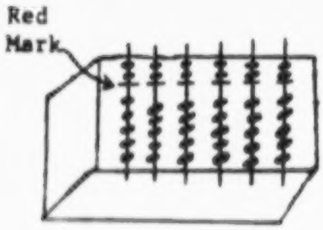
1.3.3
Reference No.

ACTIVITY TITLE: Make An Abacus

OBJECTIVE: The student will describe the historical methods used for storing information prior to electronic computers.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*		

DESCRIPTION: Make an abacus using the materials listed below:



1. Construct box on attached sheet.
2. Cut straws to proper length. Leave at least an inch extra at each end.
3. Draw or paint a red mark 1/3 of the way down on each straw.
4. Place two pieces of macaroni above the red mark and five pieces of macaroni below the red mark.
5. Insert straws into + marks on box (you can paper punch the holes for the straws).

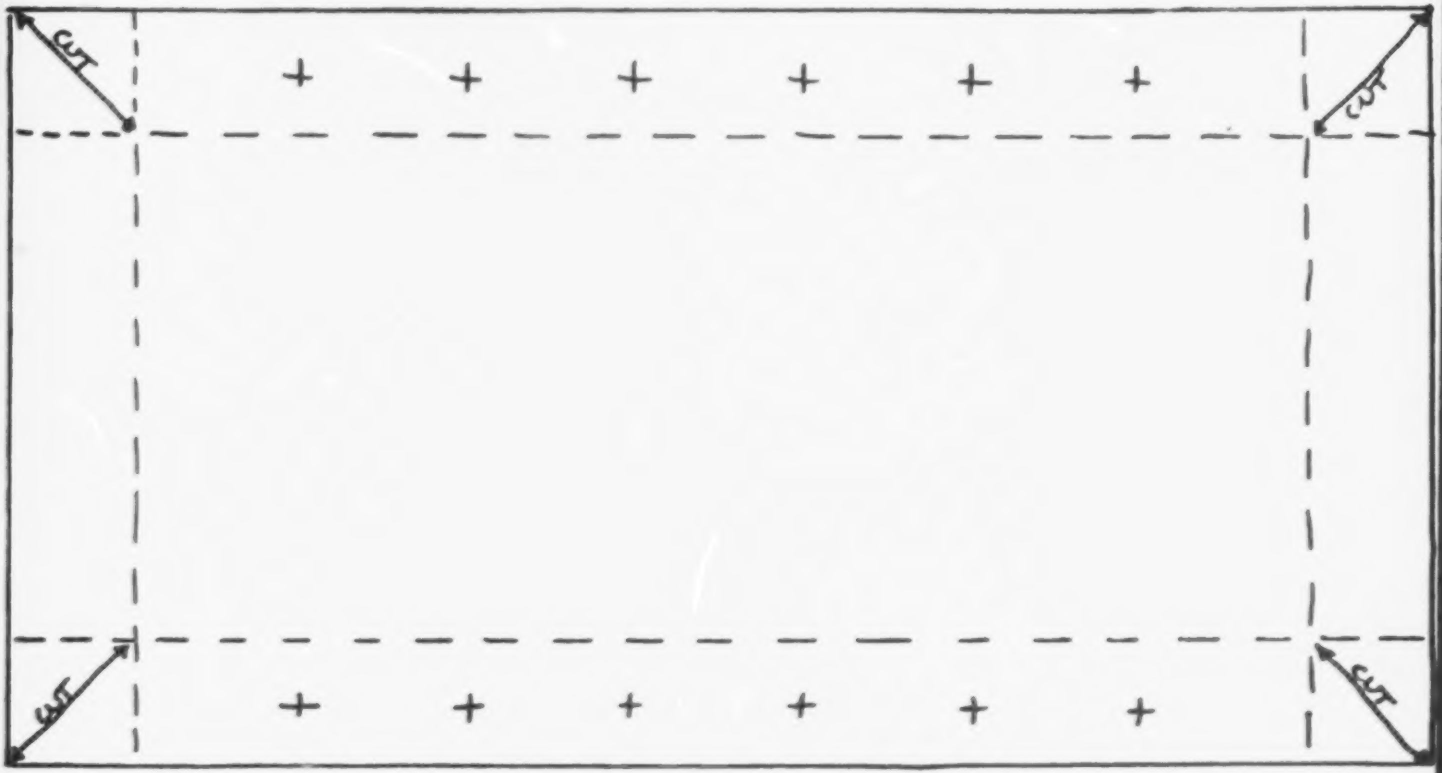
MATERIALS REQUIRED: Duplicated box diagram (one for each student)
Red paint or marker
Straws (six for each student)
Macaroni
Tape
Scissors

ADDITIONAL RESOURCES:

If you can locate a cheap source of abacus, purchase a classroom set.

Please refer to Abacus Resource Unit in 1.3.5.

MAKE AN ABACUS


CUT
CUT
CUT
CUT

Fold on dotted lines + indicated
point where straw goes through box.

1.3.4
Reference No.

ACTIVITY TITLE: Using An Abacus For Addition

OBJECTIVE: The student will describe the historical methods used for storing information prior to electronic computers.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	

DESCRIPTION: The student will use an abacus to do addition and subtraction problems. The teacher needs to go through the example problems and explain the intermediate steps to solving the problems. The teacher must generate their own addition problems for practice. You can also expand the use of the abacus for subtraction or other operations.

MATERIALS REQUIRED: Paper
Pencil
Abacus for each student
Student activity worksheets

ADDITIONAL RESOURCES: The teacher should read the two sheets on addition and subtraction with the abacus prior to using this activity.

ABACUS DESCRIPTION

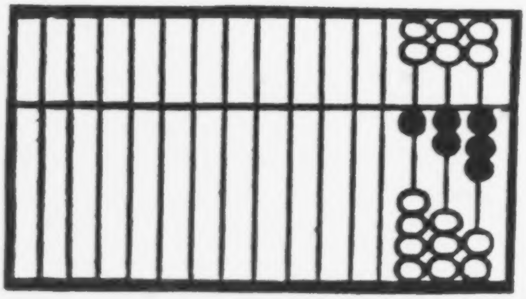
Chinese Abacus

The abacus is a computing instrument used by the Chinese for generations. Each bead below counts 1, each one above counts 5. Working from right to left, each column represents units, tens hundreds etc. You can operate the Abacus with the right hand only. The thumb moves the first point bead upward, the index finger moves the first point bead downwards, the middle finger moves the 5th point bead up and down.

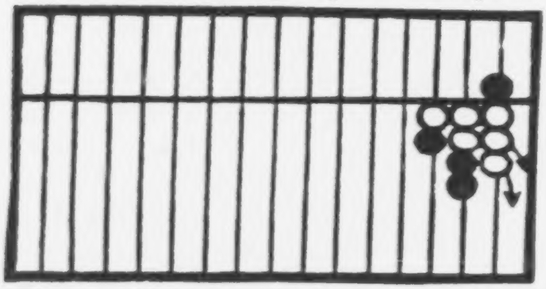
ADDITION

To add for example: 123 + 123

Set up the figure from the block in 5 thus:



In the same column, repeat the operation

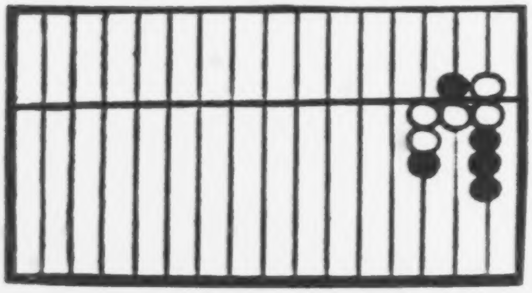


○ already

● newly added

Your reply reads 246

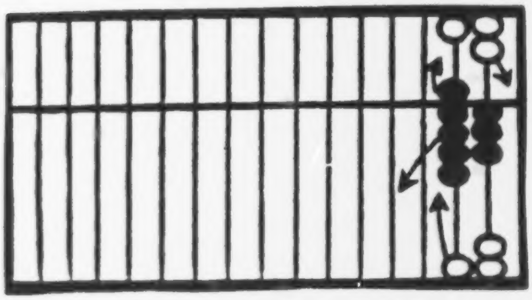
If you add another 123 to this figure your abacus will show 369

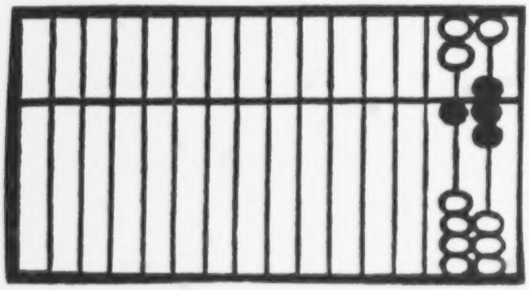


The calculation of each column is completed before the next is undertaken, when the 5 lower beads are against the separating bar, one 5 point bead is moved downwards and the 5 one point beads are moved back to their starting position. When both the 5 point beads are down, one 1 point bead in the next left hand column is moved up and two 5 point beads are returned to their original position. It is not possible to have a reply showing both 5 point beads at the down position as this denotes "10". Start always with the first column at your right and proceed to the next column.

SUBTRACT

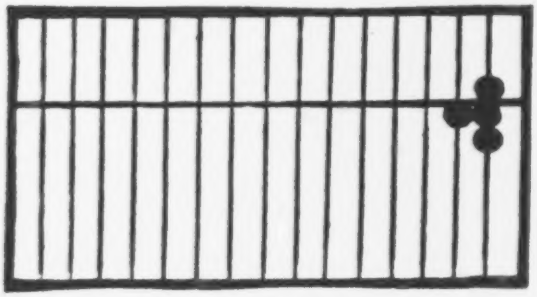
Set up the original figure as for adding. Subtraction is made from left to right. To subtract for example: 93 - 76 on the abacus.





Subtract 7 from the left column, raise one 5 point bead and lower two 1 point beads. In the right side column, subtract 6. As you cannot subtract 6 from 3 borrow 10. Lower one 1 point bead in the left column (which leaves you with only one 1 point bead in your left or "tens" column). In order to borrow 10 in the left column, lower two 5 point beads in the upper right column. You have now beads to the value of 13 in the right column. Raise one 5 point bead and lower one 1 point bead which leaves you with one 5 point bead above and two 1 point beads below the bar = 7.

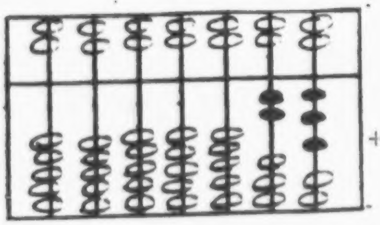
Your abacus now reads = 17



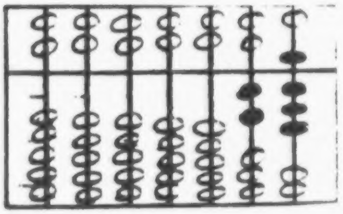
(If you wish to check the correctness add 17 + 76 and your reply should read 93)

a) Example

23
+5



+5

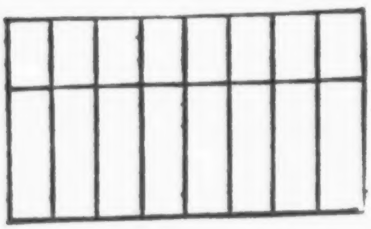


23

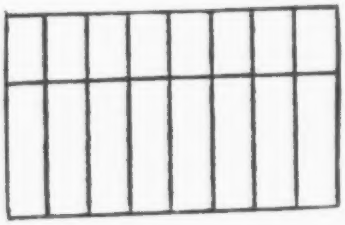
= 28

Draw in the beads (like the example) for each problem.

1) 57
+12



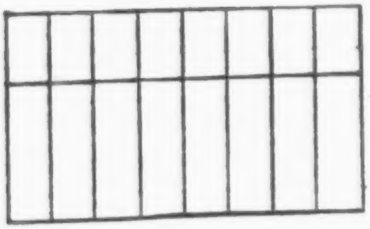
+12



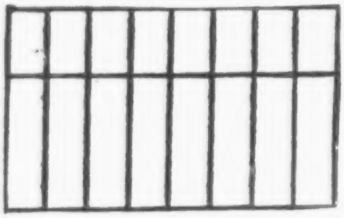
57

= ?

2) 152
+43



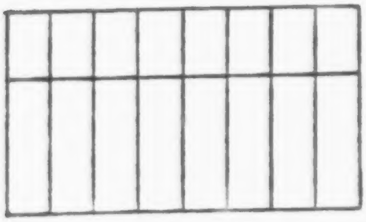
+43



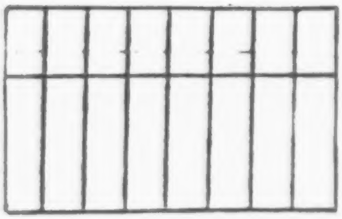
152

= ?

3) 218
+35



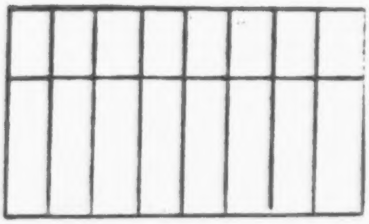
+35



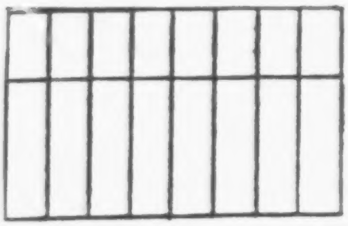
218

= ?

4) 407
+195



+195

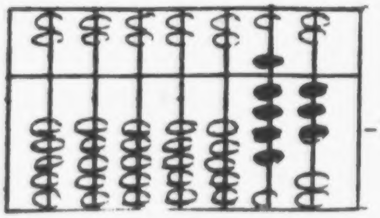


407

= ?

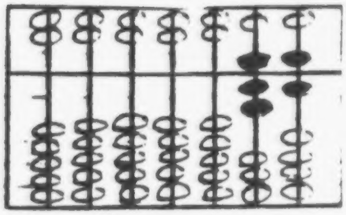
a) Example

93
-76



-76

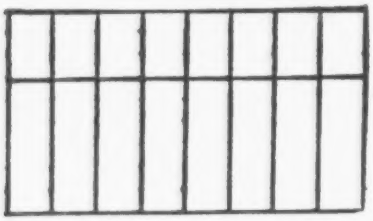
93



= 17

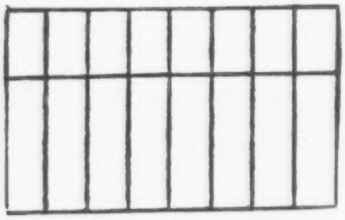
Draw in the beads (like the example) for each problem.

1) 143
-22



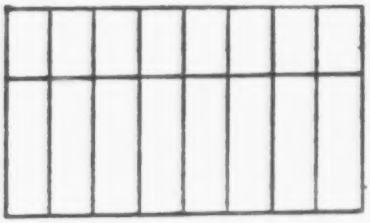
-22

143



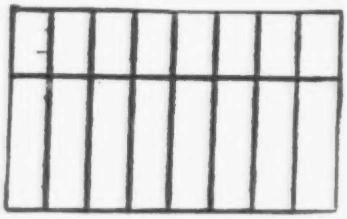
= ?

2) 596
-273



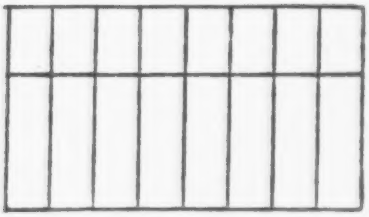
-273

596



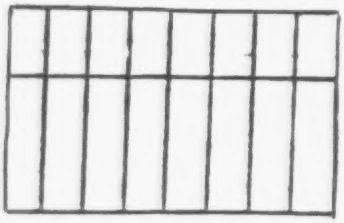
= ?

3) 204
-111



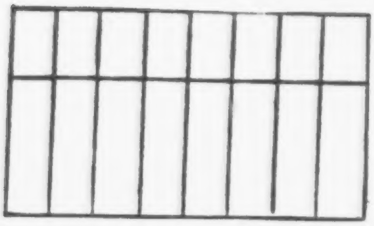
-111

204



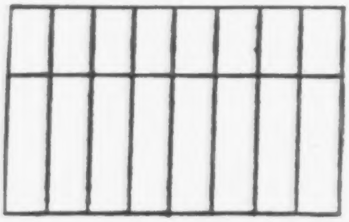
= ?

4) 83
-57



-57

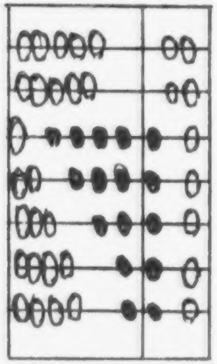
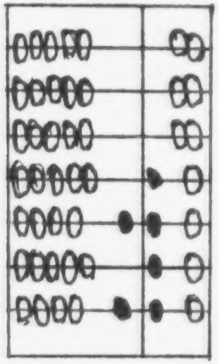
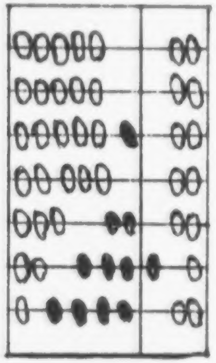
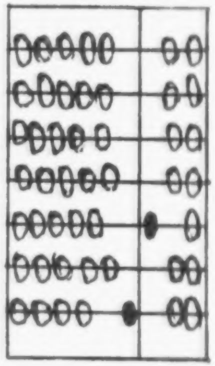
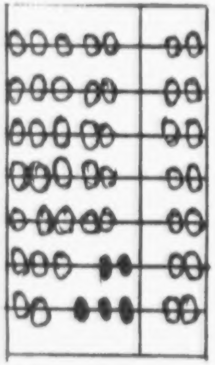
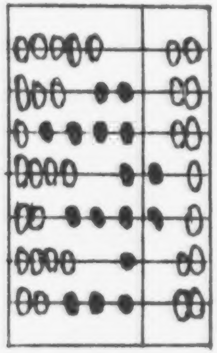
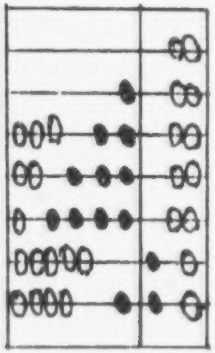
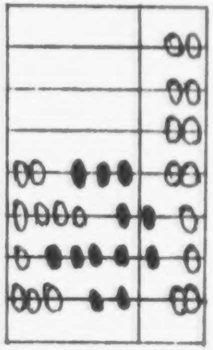
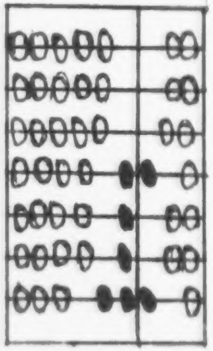
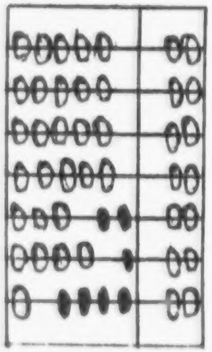
83



= ?

What number is represented on each abacus?

(write the number below each abacus)

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copy for extension activities.

1.3.5
Reference No.

ACTIVITY TITLE: Color Code Language

OBJECTIVE: The student will describe the historical methods used for storing information prior to electronic computers.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*			

DESCRIPTION: Students will learn about what a simple computer language is, write (with colored strips) programs, and test these by acting as a computer. See the following pages for a description of the activity.

MATERIALS REQUIRED: Copies of colored strips for each student
Two (2) scissors

ADDITIONAL RESOURCES:

COLOR CODE LANGUAGE

Purpose:

1. Demonstrate the use of a computer "language" or set of instructions. Students will experience what a computer language is and how it is used.

2. Demonstrate the difficulty of solving a problem with a limited number of instructions to work with.

3. Practice solving problems and translating color codes into actions.

Background:

Computer programming languages use a very limited number of commands to solve very complex problems. Many of the arcade games for microcomputers are written using less than 60 basic commands (and very simple commands at that!). The speed of the computer allows a programmer to string thousands of these commands together to create lively and entertaining action.

In this activity, students will practice with an "action" langauge which ony has five commands. Each command has a different paper color strip and by arranging these strips, students can create simple programs to solve problems.

Materials and Preparation:

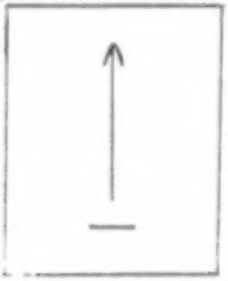
Make five dittos, each filled with one of the five patterns given below. Then make copies of these dittos on the colored paper indicated above each strip. For example, the first should be copied on green paper. Make enough copies so that for each student there are:

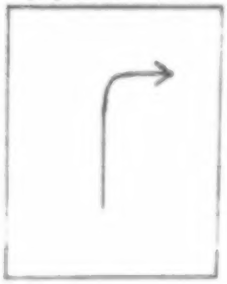
8 GREEN
6 RED
4 BLACK
2 DARK BLUE
2 SILVER

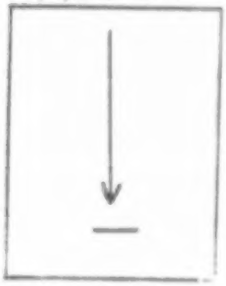
Colors can be substituted, if necessary, but these particular colors might help students remember what instruction each color strip represents.

1.3.5

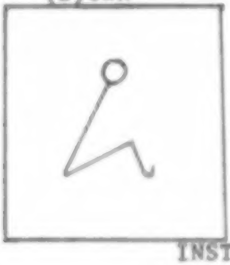
Color:	(G)REEN	(R)RED	(B)LACK
What it Does:	(G)O AHEAD	(R)IGHT TURN	(B)ACK ONE



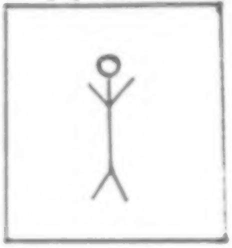




(D)ARK BLUE
(D)OWN



(S)ILVER
(S)TAND



INSTRUCTIONS
WHAT THEY MEAN

Each colored strip stands for a different action. Here is an explanation of what each color means:

1. (G)reen - Go Forward One Step
   Students will move forward one step when this color is active. If the student is on the floor (see (D)own), the student will move on his/her hands and knees an equivalent distance.

2. (R)ed - Right Turn
   The student will turn right 90 degrees. Two red cards will result in turning in turning the student around. Four cards would turn the student all the way around. This instruciton can be used when the student is either standing or sitting.

3. (B)lack - Back One Step
   The student will move one step back. This is just the opposite of the Green - Go instruction described above.

4. (D)ark Blue - Down
   The student will either sit down on the floor or in a chair, if one is close.

5. (S)ilver - Stand
   The student will stand up.

Directions:

1. Give each student a packet of cards as indicated above.

2. Demonstrate with the students what each card stands for. First, hold up the GREEN card and demonstrate a forward step and talk about variations in steps from person to person. Have students practice these commands as you hold up different colored cards.

   Practice putting combinations of cards together. For example, hold up a green card then another green card and have students respond to each card. Students should end up in an about face position. Try other combinations of the cards and have students practice these as a group so that all of them are aware of what each card means.

3. Have students solve these simple action problems by organizing their cards to accomplish the given task.

   a. Turn left 90 degrees (remind students that they only have "turn right" cards). Starting position for the problem: Standing.
   Pose Solution: RED-RED-RED

   b. Turn a full circle.
   Starting position: Standing.

   c. Sit down in a chair.
   Starting Position: Standing behind a chair, facing it.
   Possible Solution:
   RED-RED-RED-GREEN-RED-GREEN-RED-RED-RED-BLACK-DARK-BLUE

   d. Go through neighbor's legs and stand up.
   Starting position: Standing, facing neighbor.
   Possible solution: DARK BLUE-GREEN-GREEN-SILVER

4. Have students brainstorm other action problems for color code programming. Then, have each student try solving them with their color coded instructions. Have students act as computers and try following each other's instructions.

ACTIVITY TITLE: What's This?

OBJECTIVE: The student will describe the growth of computing hardware development.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*		

DESCRIPTION: This activity is a matching exercise in which the student identifies types of computer hardware. For elementary students, the teacher may wish to have students point to the appropriate pictures as the teacher reads the list of names.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: Billings, Karen and Moursand, David, Are you Computer Literate?

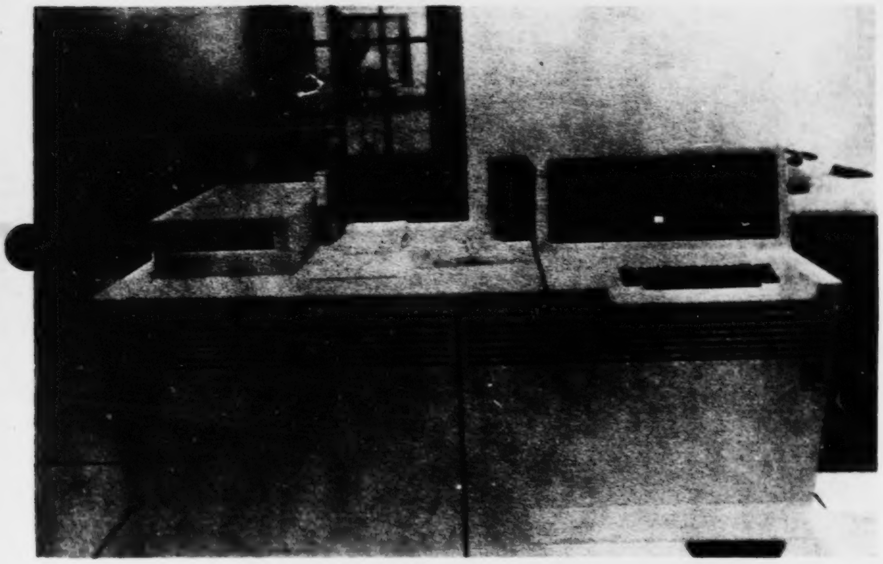
Answer key:
1. Central processing unit
2. Central processing unit
3. Optical mark reader (scanner(s)
4. Optical mark reader (scanner(s)
5. Tape drive
6. Disk drive
7. Line printer
8. Printer/keyboard
9. Word processing station
10. Key punch station
11. Microcomputer, monitor and disc drive
12. Keyboard terminal (hard copy)

WHAT'S THIS?

HOW'S YOUR MEMORY?

What are the names of these pieces of computer equipment? Choose from the list below.

- Tape Drive
- Key Punch Station
- Keyboard Terminal (Hard Copy)
- Disk Drive
- Word Processing Station
- Optical Mark Reader (Scanner(s)
- Microcomputer, Monitor & Disc Drive
- Line Printer
- Central Processing Unit(s)
- Printer/Keyboard



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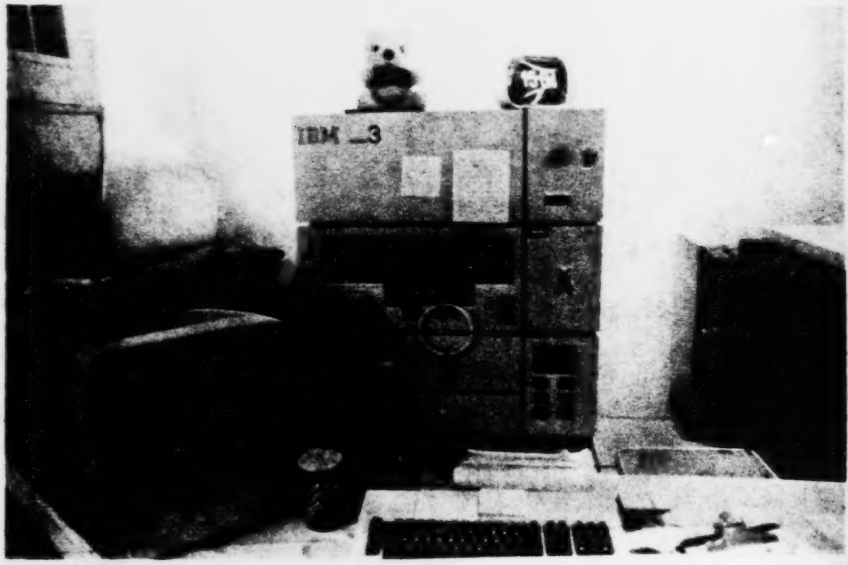
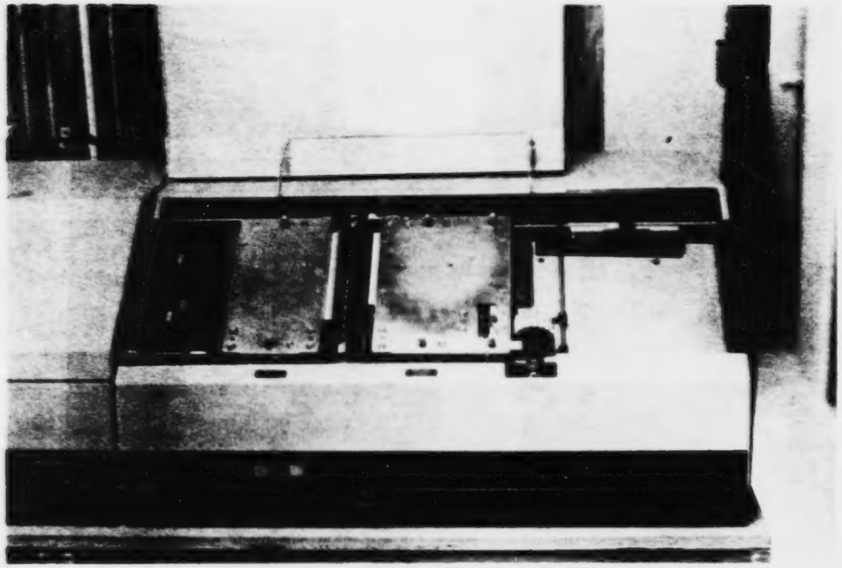


2. ____________________

3. ____________________



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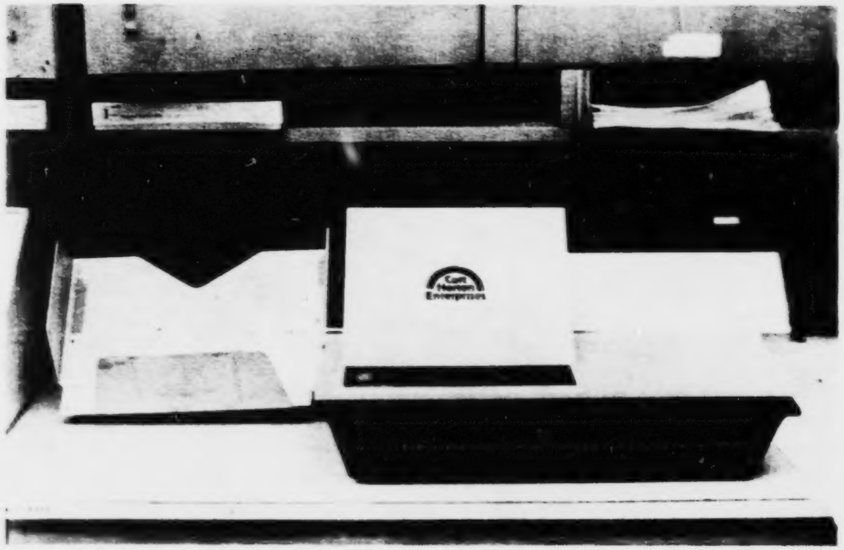

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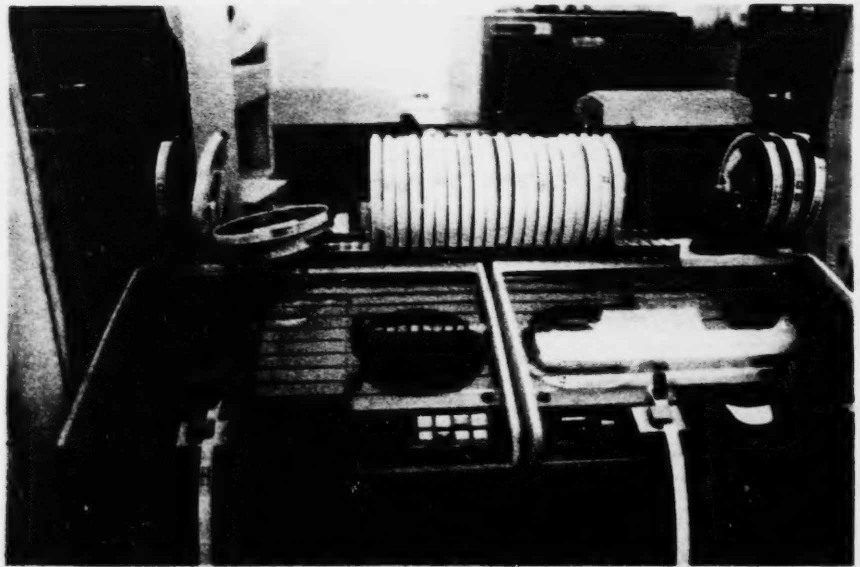

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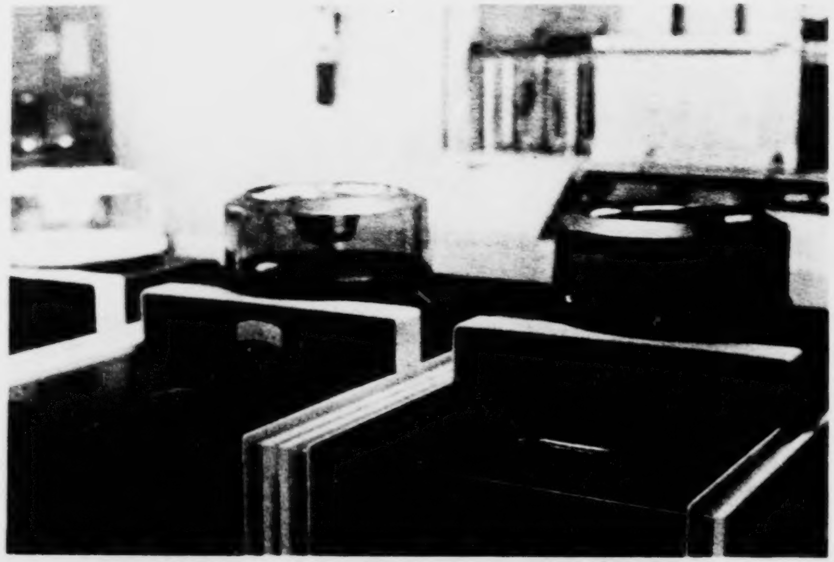

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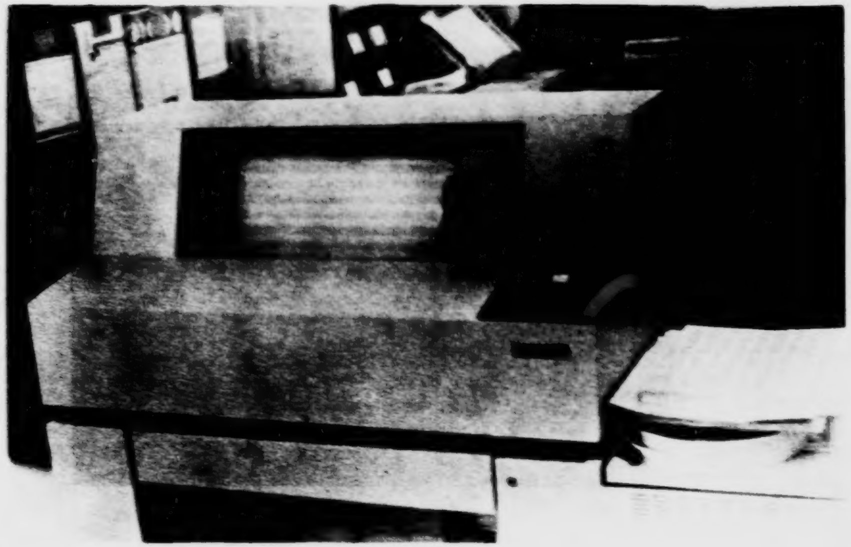

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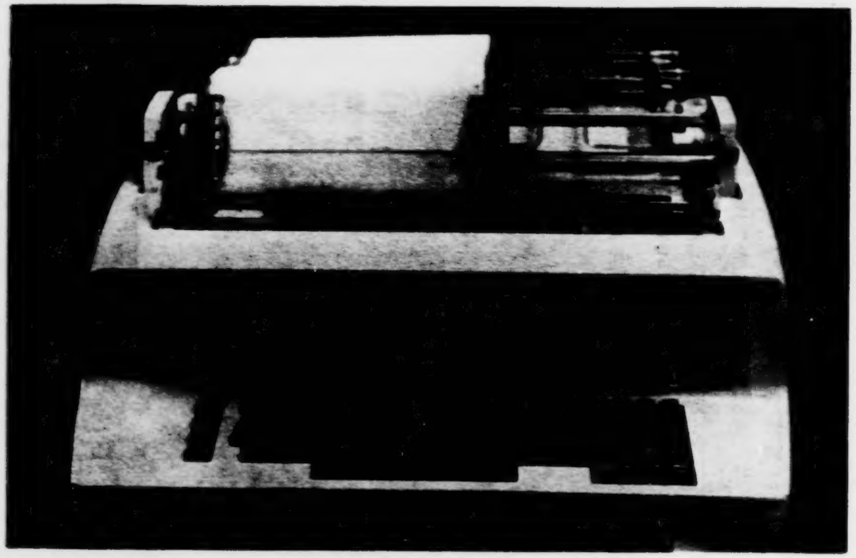

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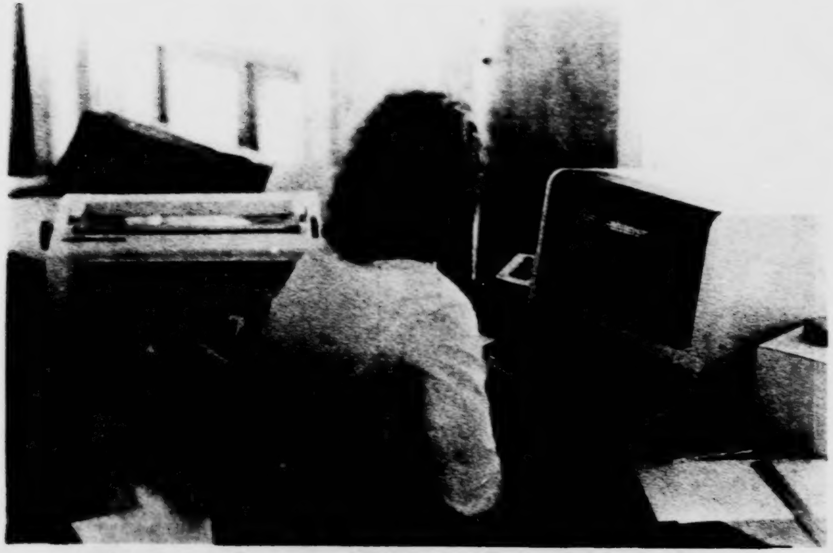

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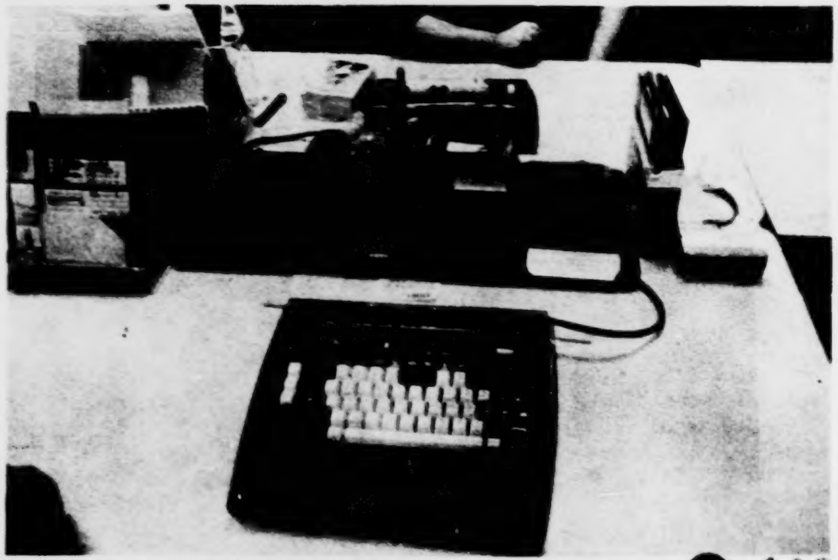

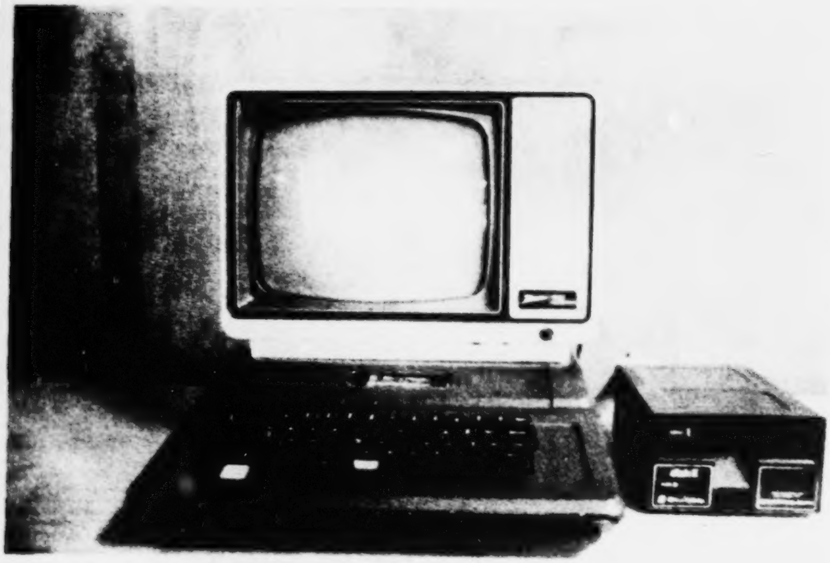

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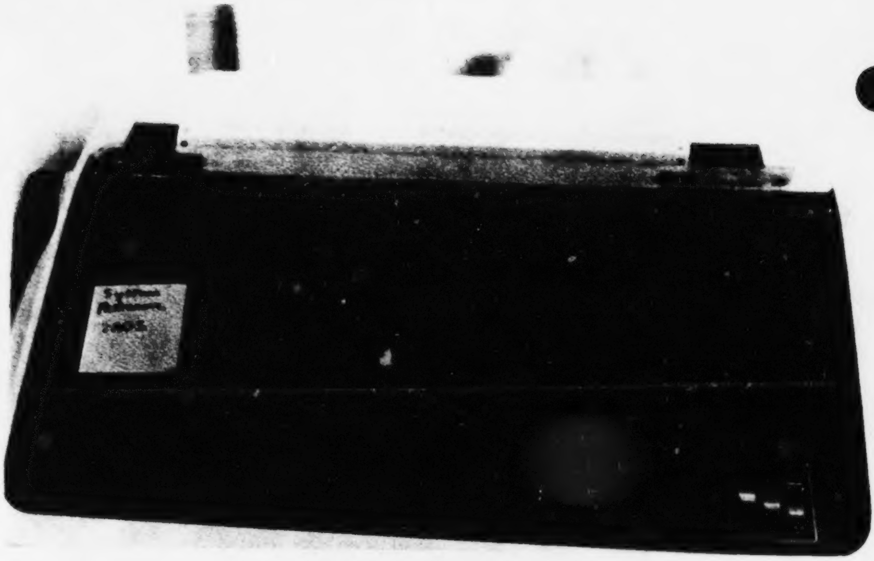

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From: Are You Computer Literate?, page 102.

1.4.2
Reference No.

ACTIVITY TITLE: Add-Subtract Slide Rule

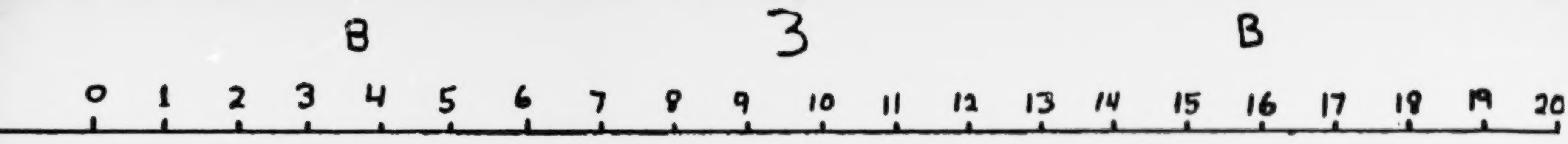
OBJECTIVE: The student will describe the growth of computing hardware development.

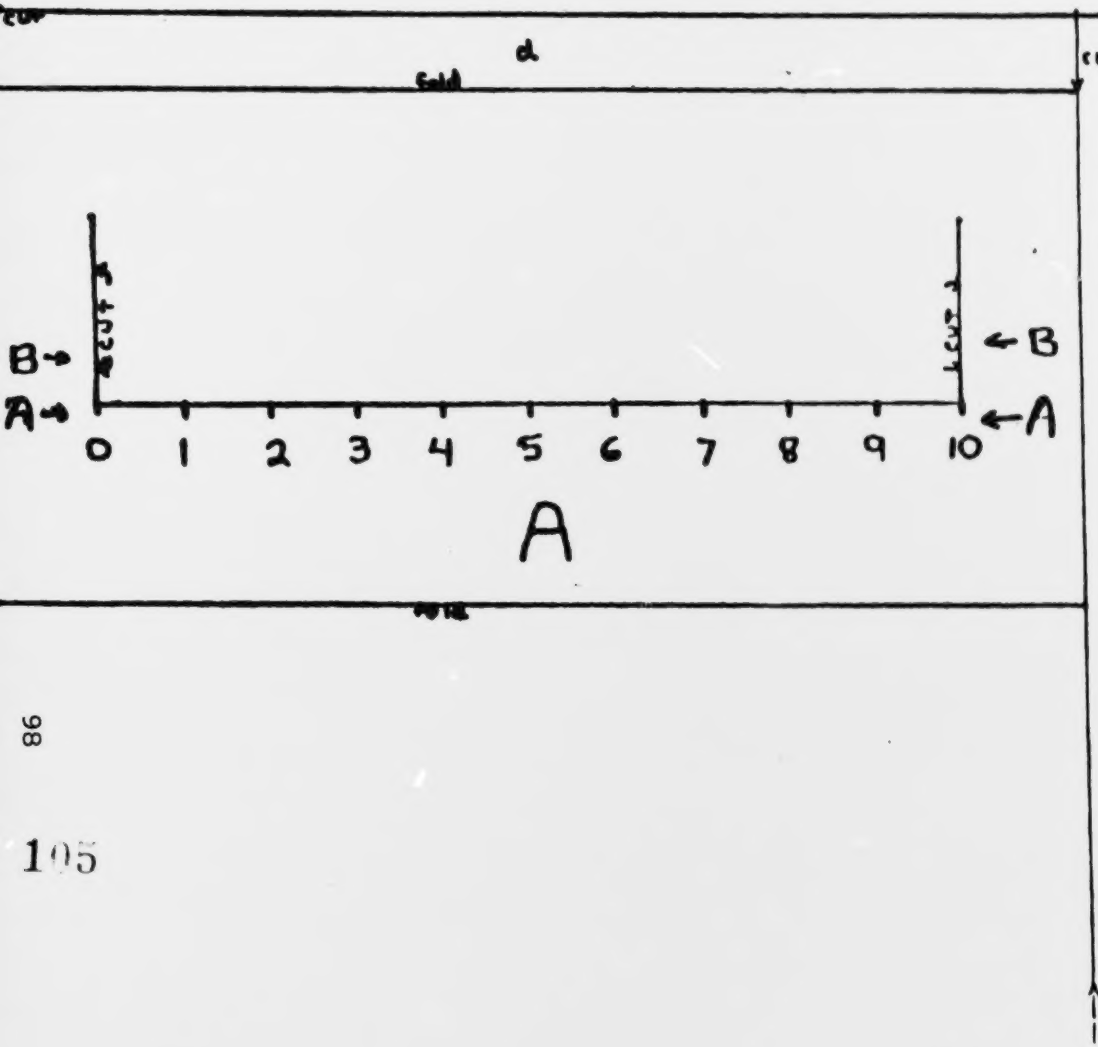
GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	

DESCRIPTION: The student will build a simple addition and subtraction tool and learn how to use it. Students learn how CALCULATION tools can be used to help solve problems. Also, provides practice in addition, subtraction and problem solving.

MATERIALS REQUIRED: Construction sheets
Student activity worksheet
Tape or glue
Scissors
Pencil

ADDITIONAL RESOURCES:

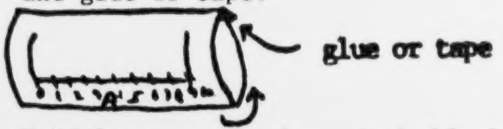

B
3
B
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20


cut
cut
d
fold
cut
cut
B→
A→
cut
←B
←A
0 1 2 3 4 5 6 7 8 9 10
A
fold
cut

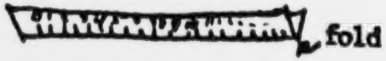
ADD-SUBTRACT SLIDE RULE

How to put together

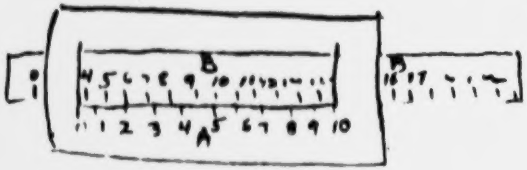
1. Cut off the two pieces on the lines with "cut". Also, cut the two slits in the large square sheet.
2. Take the large sheet and fold side c under and fold edge d down on c and glue or tape.


glue or tape

3. Fold long narrow sheet in half along the numbers with the numbers on the outside to make a ruler.



4. Slip the ruler through the cut slots so that the ruler shows between the two slots.



ADD-SUBTRACT SLIDE RULE

1.4.2

ACTIVITY SHEET
FOR
ADD-SUBTRACT SLIDE RULE

Once you have made your slide rule you can use it to solve some addition and subtraction problems. Other types of slide rules have been used for many years to do multiplication, division, and more before the electronic hand-held calculator came on. First, follow directions and make the add-subtract slide rule then let's see how it works.

I. Addition

Example: $\begin{array}{r} 8 \\ +\ 5 \\ \hline \end{array}$

1. Hold slide rule with A down.
2. Find the top number (8) on the B scale and slide it so it is directly over the 0 on the A scale.
3. Now find the bottom number (5) on the B scale. The number above it is the answer (13).

Try these problems:

$$\begin{array}{r} 3 \\ +\ 8 \\ \hline \end{array} \qquad \begin{array}{r} 9 \\ +\ 4 \\ \hline \end{array} \qquad \begin{array}{r} 11 \\ +\ 8 \\ \hline \end{array} \qquad \begin{array}{r} 6 \\ +\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ +\ 6 \\ \hline \end{array} \qquad \begin{array}{r} 7 \\ +\ 7 \\ \hline \end{array} \qquad \begin{array}{r} 14 \\ +\ 3 \\ \hline \end{array} \qquad \begin{array}{r} 12 \\ +\ 7 \\ \hline \end{array}$$

How would you do these?

$$\begin{array}{r} 6 \\ 2 \\ +\ 5 \\ \hline \end{array} \qquad \begin{array}{r} 3 \\ 8 \\ +\ 5 \\ \hline \end{array} \qquad 7 + 2 + 8 =$$

There are five people in the room. Two girls and three more boys came in. How many people were there?

II. Subtraction

Example: $\begin{array}{r} 9 \\ \underline{+\ 4} \end{array}$

1. Find the top number (9) on the B scale and move it so it is directly over the bottom number (4).

2. The number on the B scale (5) above the 0 on the A scale is the answer.

Try these:

$$\begin{array}{r} 10 \\ \underline{-\ 6} \end{array} \qquad \begin{array}{r} 8 \\ \underline{-\ 3} \end{array} \qquad \begin{array}{r} 9 \\ \underline{-\ 9} \end{array} \qquad \begin{array}{r} 12 \\ \underline{-\ 8} \end{array}$$

$$\begin{array}{r} 13 \\ \underline{-\ 8} \end{array} \qquad \begin{array}{r} 18 \\ \underline{-\ 9} \end{array} \qquad \begin{array}{r} 15 \\ \underline{-\ 7} \end{array} \qquad \begin{array}{r} 14 \\ \underline{-\ 8} \end{array}$$

And these?

$4 + 9 - 6 =$ $\qquad$ $6 + 9 - 2 =$

Tom had 18 grapes. He gave seven to Sue and four to Jim. How many did Tom have left?

1.4.3
Reference No.

ACTIVITY TITLE: Computer Check-Up

OBJECTIVE: The student will describe the growth of computing hardware development.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: Computer check-up is an activity which encourages students to think about the similarities and differences between computers and calculators. This activity could be used as a discussion generator.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: Billings, Karen and Moursund, David
Are You Computer Literate?

Answer key: By filling in the blanks, it will spell VW.

1.4.3

COMPUTER CHECK-UP

What is a Computer?

What Gets the Computer Check-Up?

Shade the box under the most appropriate response. Turn your paper around sideways to find out the name of a company that uses computers to help design and build its cars - as well as to diagnose engine problems for the owners.

	Both	4-Function Calculator	Computer	Neither
1. It is used as an aid to problem solving.	▨			
2. Most of its users are solving math-type problems.				
3. It can process words as well as numbers.				
4. It keeps getting more and more expensive.				
5. It can use a keyboard terminal for input and output.				
6. It can solve any problem imaginable.				
7. It uses magnetic tape and disk for secondary storage.				
8. It has a key for each "instruction" it understands.				
9. It is a digital computing device.				
10. It carries out computations and outputs an answer.				
11. It can be purchased for $10 or less.				
12. It can use an output device called a line printer.				
13. It can operate without being told what to do.				
14. It can cost a few hundred to a few million dollars.				
15. It is usually portable and battery powered.				
16. It contains electronic circuitry.				

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From: Are You Computer Literate?, page 21.

1.5.1
Reference No.

ACTIVITY TITLE: Lingo For A Computer

OBJECTIVE: The student will describe the development of computer languages.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: The student will review the development of computer languages. Students will then experience the development of a "language" in a simulation.

MATERIALS REQUIRED: Pyramidal development sheet
Language sheets

ADDITIONAL RESOURCES: The Information Machine (Improved Cardiac)
Pacific Northwest Bell
Film Library Room 2B02
1600 Bell Plaza
Seattle WA 98191
Toll free number 1-800-426-0205
Pacific Northwest Bell will send a class set
(One Information Machine for every two students at no charge).

1.5.1

LINGO FOR A COMPUTER

BACKGROUND:

As computers developed in the last 35 years, so did the languages used to program them. The earlier languages were closely linked to the computer's hardware structure and required numeric codes for a program. This is usually referred to as machine language. Latter, mnemonics, or code words, were used to do the same function as one or more code numbers making programming much easier. This language was called an Assembler language.

Still, though, life was not easy for the general user. Thus was born languages that combined assembler codes into a single command that used common English words. Some of these languages were called Fortran, BASIC, and COBOL.

The language development can be viewed as a pyramidal structure - see diagram. Each language level is built on the preceding one. An example of the commands at each level are given at each level.

The following activity gives students a chance to develop a chalkboard language in a progressive development from a primitive version to a refined language.

ACTIVITY:

First, discuss with students the information provided in the background and display the pyramid. Now, you are going to have your students work with an "action" language.

Level 1: Hand-out the "Primitive Language Code" sheet and explain that at this level only the number codes can be used with the "computer". Have the students study the sheet and be sure they understand it.

Appoint a student to act as the "computer". Have the person leave the room and study the code sheet. With the rest of the class decide what you want the "computer" to do. Assume the student will start at your desk or convenient location within the room. Now have the students write a program in the code to do the example. Write only the code on the board.

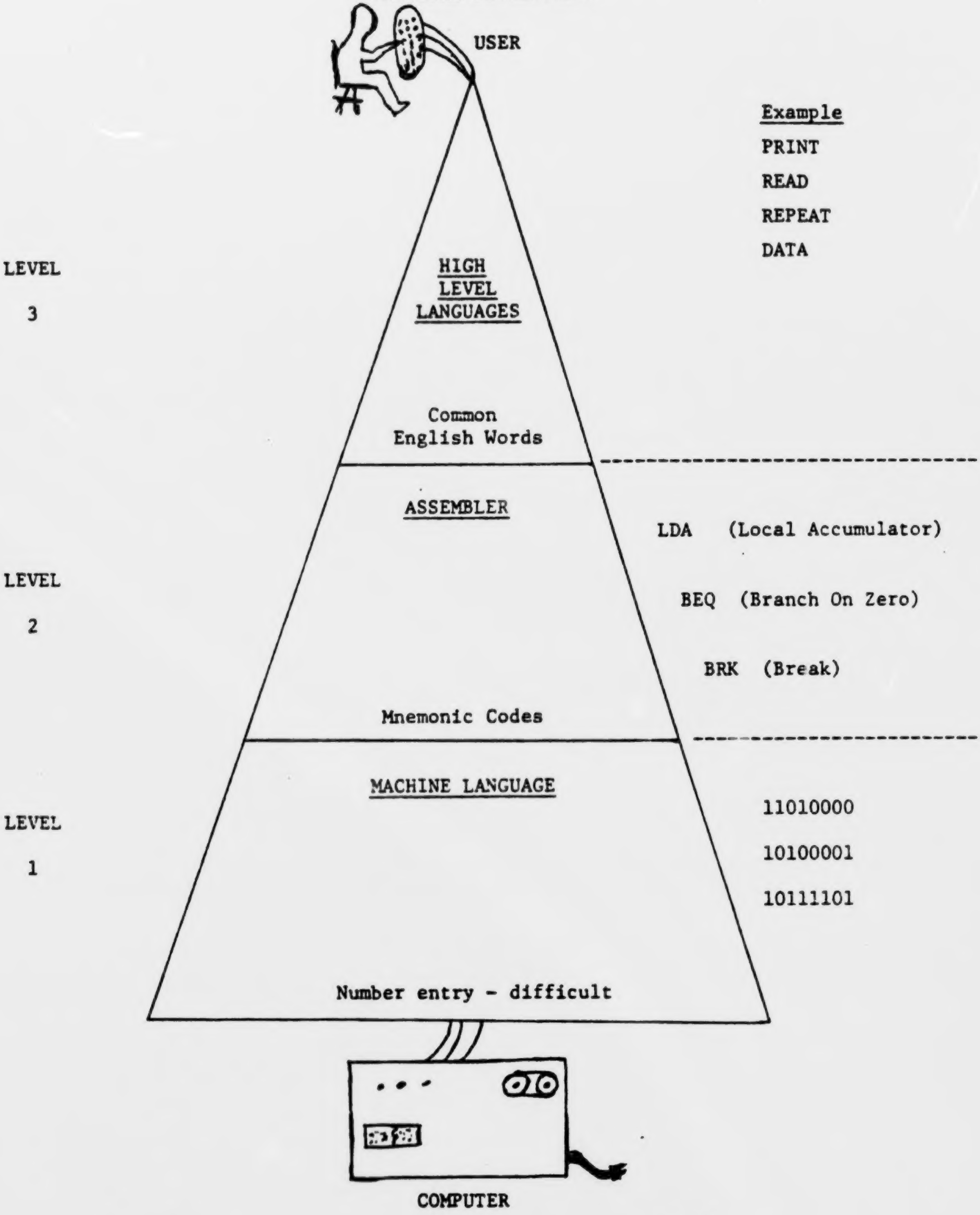
Example:	00	Your description:
	01 - 2	Begin action
	02	2 steps forward
	01 - 2	Turn left
	10 - Chair	Find chair nearest computer
	11	Sit in chair

Have a student in the class test out the program as it is written to make sure that it will work. Then have the "computer" come back, start the person in the right location, and begin to run the program written on the board. Have another act as a counter to check off each step completed. Observe and discuss.

Level 2: Hand out the "Level 2 Language - MNEMONICS". Do the same procedure as in Level 1. Discuss the differences in the languages.

Level 3: Hand out the "Level 3 Language - HIGH LEVEL". Repeat above procedures and discuss what advantages and disadvantages there would be with each language level. If possible, get sample programs in different languages and discuss.

COMPUTER LANGUAGES:
A
PYRAMIDAL DEVELOPMENT


USER
Example
PRINT
READ
REPEAT
DATA
LEVEL
3
HIGH
LEVEL
LANGUAGES
Common
English Words
ASSEMBLER
LDA (Local Accumulator)
LEVEL
2
BEQ (Branch On Zero)
BRK (Break)
Mnemonic Codes
MACHINE LANGUAGE
11010000
LEVEL
1
10100001
10111101
Number entry - difficult
COMPUTER

1.5.1

LEVEL 1 LANGUAGE - PRIMITIVE CODES

Code	What Action It Will Do
00	Begin Action
01	Move forward indicated steps (Example: 01-3 - Forward 3 paces)
02	Turn left 90 degrees
03	Turn right 90 degrees
04	Turn around (180 degrees)
05	Pick up item (Example: 05-pencil - pick up a pencil)
06	Walk backward indicated steps (Example: 06-7 - Walk backward 7 paces)
07	Lift arms to eye level
08	Lower arms
09	Drop items in hands
10	Locate item mentioned nearest you (10 chair - find the nearest chair)
11	Sit down
12	Stand up
13	Stand on object (13-desk - stand on desk)
14	End Action

LEVEL 2 LANGUAGE - MNEMONICS

Code		What It Will Do
BGN	-	Begin Action
FRD	-	Move forward indicated steps (Example: FRD 4)
BWD	-	Move backward indicated steps (Example: BWD 2)
TRN	-	Turn indicated number of right angles to the left (Example: TRN 30 - Turn)
LPU	-	Locate and pick up item (LPU Pencil - Find nearest pencil and pick up)
STU	-	Stand up
STD	-	Sit down
LSO	-	Locate and stand on object (LSO - Chair)
END	-	End action
RAR	-	Raise arms to eye level
LAR	-	Lower arms
DRP	-	Drop items in hands

Sample Program:

```
BGN
FRD 4
TRN 1
FRD 2
LPU ERASER
RAR
END
```

1.5.1

LEVEL 3 LANGUAGE - HIGH LEVEL

Code		What It Will Do
START	-	Begins action
MOVE	-	Move to indicated location (Example: MOVE END OF CHALKBOARD)
GET	-	Get nearest object mentioned (Example: GET BOOK)
UP	-	Stand up
DOWN	-	Sit down
CLIMB	-	Stand on object (Example: CLIMB TABLE)
RAISE	-	Raise arms
LOWER	-	LOWER ARMS
DROP	-	Drop items in hands
END	-	Stop action

Sample Program:

```
START
MOVE JOE'S DESK
GET PENCIL
MOVE GAIL'S DESK
DROP
DOWN
END
```

1.6.1
Reference No.

ACTIVITY TITLE: Computer Chases Criminals!

OBJECTIVE: The student will describe social pressures behind technological development.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: A True - False Quiz and a matching activity which contain general topics dealing with computer history and current use. This activity can be used to generate discussion topics dealing with the concept that some current uses of computers are the result of social pressures.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: See Historical Resources Unit, 1.0.1.

Educational Computing Shop.

Key to computer chase criminals: THEY WENT DATA WAY

Key to activity:
1. T
2. T
3. T
4. F
5. F
6. T
7. T
8. F
9. T
10. F

COMPUTER CHASES CRIMINALS!

How did the computer help chase down the criminals?

Match each statement with the best work on the right. No words are used twice. Not all words are used.

____1. Initially the most common way to input data to a computer.

____2. A machine that inputs data from test scoring sheets.

____3. Used on checks to read a person's bank account number.

----4. Pattern of bars on grocery store items.

____5. Industrial or scientific instruments that send data directly into computers.

____6. Step by step set of directions telling a computer exactly how to solve a problem.

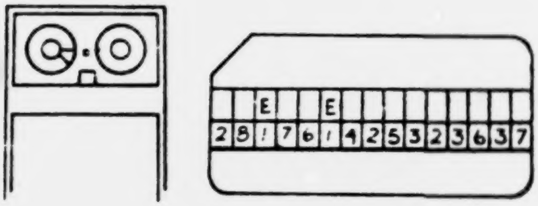
____7. Two-dimensional picture showing a step-by-step set of direction.

____8. A computer programming language.

A	magnetic ink numbers
B	data
D	sensing devices
E	key punch cards
H	BASIC
I	output
M	optical character recognition
N	universal product code
T	mark sense readers
U	ENIAC
V	integrated circuits
W	program
X	UNIVAC I
Y	flowchart

Now place your answers below in the computer's reply.

It told the law enforcement officer



Used by Permission of dilithium Press.
From: Are You Computer Literate?, pages 39 and 48.

Data entry and computer programming are two of the key ideas about computers. Test your knowledge of this area by answering the following true-false questions.

T F 1. Punched cards are a very common method for inputting data to a computer.

T F 2. Magnetic ink is used for computer input of data from blank checks.

T F 3. An optical character recognition machine can read typewriter data.

T F 4. A computer can understand anything said to it in English provided the person doesn't speak too fast.

T F 5. The universal product code on a grocery store item contains the price of the item.

T F 6. A computer program is a detailed set of instruction telling a computer what to do to solve a particular type of problem.

T F 7. A very short computer program can sometimes be used to process a large amount of data.

T F 8. All computers understand BASIC, since it is the most basic of all programming languages.

T F 9. Nowadays, many junior high students learn to write computer programs.

T F 10. One must understand binary arithmetic and machine language in order to program a computer.

Used by Permission of dilithium Press.
From: Are You Computer Literate?, pages 39 and 48

1.6.2
Reference No.

ACTIVITY TITLE: A Million?

OBJECTIVE: The student will describe social pressures behind technological development.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*		

DESCRIPTION: The teacher should read the Historical Resources Unit, 1.0.1. As background for this activity, this activity provides student motivation to think about the need for technological advancement. After the students have estimated how long it will take to count to one million, run program one and program two (below) to demonstrate how fast a computer can count to one million!

MATERIALS REQUIRED: Pencil
Paper
Microcomputer

ADDITIONAL RESOURCES: Type in the following program(s) to make the computer count to one million.

```
 0  REM PROGRAM ONE                0  REM PROGRAM TWO
10  REM COUNT TO ONE MILLION      10  REM COUNT TO ONE MILLION
20  REM BY ONES                   20  REM BY TENS
30  FOR K = 1 TO 1000000          30  FOR K = 1 TO 1000000 STEP 10
40  PRINT K,                      40  PRINT K,
50  NEXT K                        50  NEXT K
60  END                           60  END
```

A MILLION?

I. How long will it take you to count to one million? To find out, choose a partner to keep time.

A. Have your partner keep time as you count to 100 as fast as you can.

B. How long did it take? ____________ minutes

C. Copy how many minutes it took you to count here ____________.

D. Put four zeros behind your number.

E. Copy your new number (with all the zeros) under the division box and then do the divison. (Get help if you need it.)

$60\overline{)\qquad\qquad}$ Put your new number here.

F. The answer is how many hours it will take you to count to one million.

II. Can you count to one million before lunch time?

III. Could the computer count to one million before lunch?

1.6.3
Reference No.

ACTIVITY TITLE: Pressures Behind Development

OBJECTIVE: The student will describe social pressures behind technological development.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: This matching activity is designed for students to compare technological advances and the social pressures that helped bring new technology into existence. The activity may be used to promote class discussion as answers may vary. It may also be used as a stepping stone to predict future needs and subsequent technological development.

MATERIALS REQUIRED: Student activity worksheet
Pencils

ADDITIONAL RESOURCES:

PRESSURES BEHIND DEVELOPMENT

Early man developed a wheel--a technological development--in response to the social pressure to move something more easily. And such has been the case throughout history.

In the lists below, are changes brought about by social pressures. Match the pressures in the left hand column to the technological development in the right hand column.

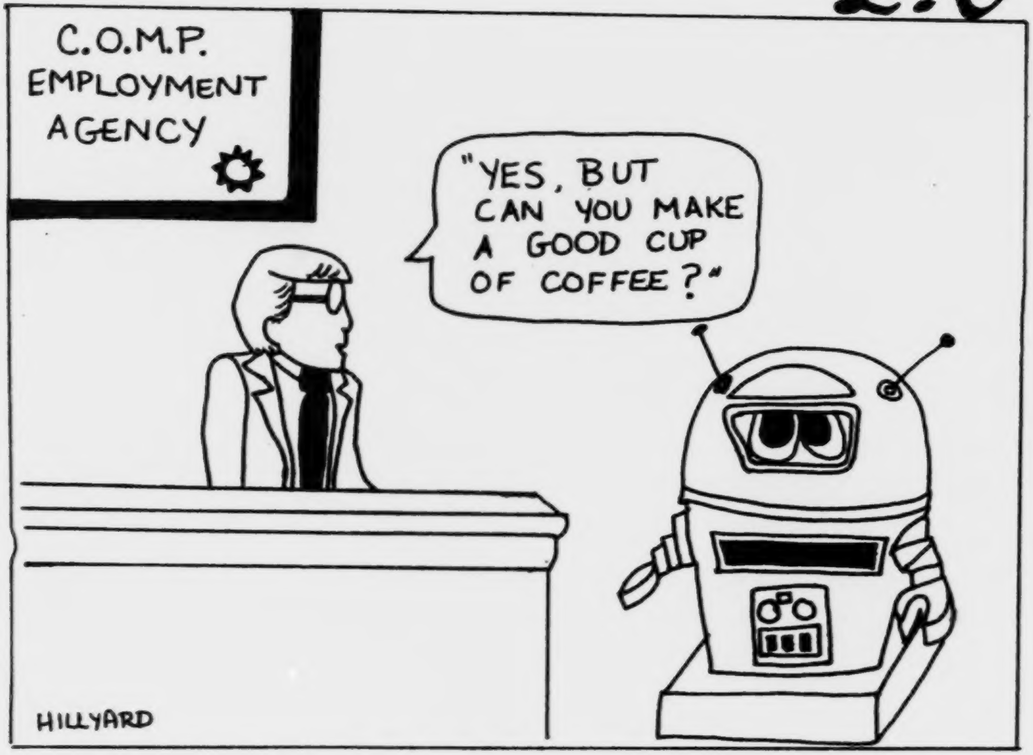
Social Pressures

a. car
b. security
c. physically handicapped
d. movement of goods and services
e. tired feet
f. massive data
g. need for protection
h. need to communicate quickly
i. "keeping up with the Joneses'"
j. need for portable computers
k. use of leisure time
l. environmental protection
m. ease of architectural design
n. move things easily
o. women in work force
p. need for lower product cost

Technological Development

_____ telephone
_____ airlines
_____ computers
_____ wheel
_____ fast food
_____ RV's
_____ burglar alarms
_____ missiles
_____ grocery scanners
_____ automated bank tellers
_____ voice operated computer
_____ smaller chips
_____ pop-top cans
_____ affordable computers
_____ Cable TV
_____ railroad
_____ fuel efficient vehicles
_____ light pen

2.0


C.O.M.P. EMPLOYMENT AGENCY
"YES, BUT CAN YOU MAKE A GOOD CUP OF COFFEE?"
HILLYARD

SCOPE AND SEQUENCE

The X indicates instruction for that level should occur.

2. The student will learn about career opportunities directly and indirectly related to computers.

	K-3	4-6	7-8	9-12
The student will:				
2.1 List examples of careers created directly by the computer industry (programmer, systems analyst, data processing, maintenance).	X	X	X	X
2.2 List examples of career affected indirectly by the computer industry (secretary, clerk, engineering).		X	X	X
2.3 Describe careers offered by local businesses that make use of computer equipment.			X	X
2.4 Describe skills required for computer related careers (courses recommended).			X	X
2.5 Describe changes made in jobs because of the computer.			X	X
2.6 Be aware that computer-related skills and experience will rapidly become requirements for a wide variety of careers.			X	X

2.0.1
Reference No.

ACTIVITY TITLE: What Do You Know?

OBJECTIVE: To assess general computer awareness.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: This activity is a true-false test which could be used to assess general computer awareness. Since computer technology is advancing so rapidly it is possible that the answers may be subject to change. Indeed, many questions should be considered as open-ended and be used as a basis for discussion.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: Are You Computer Literate?

Suggested key:
1. F
2. T
3. F
4. F
5. T
6. F
7. T
8. T
9. F
10. T

2.0.1

WHAT DO YOU KNOW?

What Else Is There To Know?

Try these questions and check your answers to see how much more there is to know about the field of computers.

T F 1. You must know a lot about computers before you can use them.

T F 2. Many thousands of people have bought computers for use in their homes.

T F 3. A computer library is a special library where you can only check out books about computers.

T F 4. The best computers can now carry on a conversation in English, much like one sees robots doing on TV programs.

T F 5. You can run programs without knowing how to write them.

T F 6. If a computer can solve a certain type of math problem, then the computer is undoubtedly the best way to solve the problem.

T F 7. Computer programmers must be good at solving complicated problems.

T F 8. Even though there are hundreds of computer programs available, it might be necessary to write your own in order to solve a problem.

T F 9. It is easy for a computer to translate the English language into a foreign language.

T F 10. Artificial intelligence has to do with how smart a computer can function.

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From: Are You Computer Literate?, page 111.

2.1.1
Reference No.

ACTIVITY TITLE: Student Created Careers Bulletin Board

OBJECTIVE: The student will list examples of careers created directly by the computer industry.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*			

DESCRIPTION: Discuss various types of careers that are involved in the computer literacy (people who design, construct, program use, repair or market computers). The teacher could collect pictures from advertisements, etc., in magazines for background. Have the students draw pictures from each of the six categories to illustrate a careers bulletin board.

MATERIALS REQUIRED: Drawing paper
Crayons
Colored pens

ADDITIONAL RESOURCES: Pictures showing people in computer careers from computer magazines such as Creative Computing, Time, Life, Electronic Learning, Popular Computers, BYTE, and Technology Illustrated.

2.1.2
Reference No.

ACTIVITY TITLE: Play Writing With Computer Careers

OBJECTIVE: The student will list examples of careers created directly by the computer industry.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	

DESCRIPTION: Have students read the information on the attached reference sheet. Discuss other careers that aren't listed. Assist students in developing a play using characters whose jobs are computer related. Include in the play a problem that needs to be solved creatively (such as sending a space ship to Mars) and demonstrate the duties of the character's jobs by how they solve the problem.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

Encyclopedia Britannica Educational Corporation, "Computers in Our Society" cassette and filmstrip series (computer careers).

Frank, Discovering Computers, pages 40-41.

Squire, The Computer: An Everyday Machine, pages 95-104.

Spencer, Exploring the World of Computers, pages 67-72.

Wood, Computer Awareness, pages 144-160.

It may be helpful to review current magazines to obtain additional information for this activity.

PLAYWRITING WITH COMPUTER CAREERS
Reference Sheet

Many careers are also available working more directly with computers. Here is a summary of some of them:

1. Computer Scientist: The computer scientist plans and researches new advances in computer technology. The scientist's work results in new types of computer hardware "machinery" as well as new advances in software instructions.

2. Systems Analyst: The systems analyst plans procedures for solving data processing problem. The analyst's plan is often in the form of a flow chart, is then given to the programmer to write the actual program.

3. Programmer: A computer programmer writes the instructions which tell a computer what to do (software). The programmer may also prepare flowcharts and perform the checkout operations to make certain that the instructions work correctly.

4. Operator: A computer operator works at the actual site of the computer making certain that the machines run smoothly. The operator may also run programs prepared by programmers and see that printed results are sent to the correct people.

From: Highline School District, Book - Meet the Computer.

2.1.3
Reference No.

ACTIVITY TITLE: Want Ads

OBJECTIVE: The student will list examples of careers created directly by the computer industry.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: Students look through the want ads to identify available jobs and classify them into career areas where computer skills are needed.

EXTENSION: Students write a letter of application in response to the want ads, using a word processor, if available.

MATERIALS REQUIRED: Newspaper (Sunday edition will be most helpful)

ADDITIONAL RESOURCES:

Encyclopedia Britannica Educational Corporation, "Computers in Our Society" cassette and filmstrip series (computer careers).

Frank, Discovering Computers, pages 40-41.

Markle, Computer Tutor, pages 44-45.

Squire, The Computer: An Everyday Machine, pages 95-104.

Spencer, Exploring the World of Computers, pages 67-72.

Wood, Computer Awareness, pages 144-160.

2.1.4
Reference No.

ACTIVITY TITLE: Who Does What?

OBJECTIVE: The student will list examples of careers created directly by the computer industry.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: This multiple choice exercise matches names of computer careers with job descriptions.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

Encyclopedia Britannica Educational Corporation, "Computers in Our Society" cassette and filmstrip series (computer careers).

Frank, Discovering Computers, pages 40-41.

Squire, The Computer: An Everyday Machine, pages 95-104.

Spencer, Exploring the World of Computers, pages 67-72.

Wood, Computer Awareness, pages 144-160.

Answer key: "Do You Speak Computerease?"

2.1.4

WHO DOES WHAT?

What did the home computer say to its new owner?

"-- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --?"

4 7 13 7 12 9 8 3 1 5 2 7 6 8 12 10 3 11 3 1 9 3

To find out, fill in the letter of the best response.

___ 1. The person who writes instructions that tell the computer how to handle information is the (a) programmer (b) computer operator (c) technician (d) data entry clerk.

___ 2. A data entry clerk (a) supervises the computer operations (b) writes the instruction to the computer (c) transcribes the instructions into computer readable form.

___ 3. Computer operators will (d) install and maintain equipment (e) supervise machine operations (f) transcribe material onto cards or tape.

___ 4. Compared to other people in the computer field, key punch operators earn a relatively (d) low salary (e) medium salary (f) high salary.

___ 5. The person who installs and maintains equipment is called a (k) field engineer or computer technician (l) computer operator (m) systems analyst.

___ 6. The person who develops methods of using the computer to solve problems is the (k) computer operator (l) manager (m) systems analyst.

___ 7. A 4-year college degree would generally be required for a person to become a (m) data entry clerk (n) computer operator (o) systems analyst.

___ 8. The person who classifies, catalogs and maintains reference material used for processing is called the (n) computer operator (o) systems analyst (p) documents librarian.

___ 9. The person earning the highest salary, relative to the others given, is the (r) programmer (s) systems analyst (t) computer operator.

___10. Data entry is a job that (r) requires programming knowledge (s) requires a 4-year college degree (t) requires little knowledge about the computer.

___11. A computer programmer needs to be able to (r) think logically, and like detailed work (s) type data into the computer quickly (t) operate all the different types of computer equipment.

___12. The person who repairs computers and does preventive maintenance is the (u) technician (v) systems analyst (w) salesperson.

___13. The number of computer related jobs is (x) decreasing (y) increasing (z) remaining about the same.

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From: Are You Computer Literate?, pages 103-104.

2.1.5
Reference No.

ACTIVITY TITLE: Interview

OBJECTIVE: The student will list examples of careers created directly by the computer industry.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Students are to interview persons who use computers actively in their work. Before the students actually interview people, use class time to brainstorm possible questions they could ask. Obviously, all questions would not be appropriate to all people interviewed. Here are some sample questions:

1. What is your name?
2. Where do you work?
3. What is your occupation?
4. What are your specific job responsibilities?
5. What do you do with the computer?
6. Did you do the same job before without a computer?
7. What future plans do you have that include the computer?
8. What is your salary?
9. What type of training did you receive?

MATERIALS REQUIRED: Paper and pencil, names of possible people to interview (these names could come from your students)

ADDITIONAL RESOURCES:

Encyclopedia Britannica Educational Corporation, "Computers in Our Society," cassette and filmstrip series (computer careers).

Frank, Discovering Computers, pages 40-41.

Squire, The Computer, pages 95-104.

Spencer, Exploring the World of Computers, pages 67-72.

Wood, Computer Awareness, pages 144-160.

2.1.6
Reference No.

ACTIVITY TITLE: Writing To Computer Manufacturers

OBJECTIVE: The student will list examples of careers created directly by the computer industry.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Write to computer manufacturers and software publishers to request information about their career opportunities.

EXTENSION: These letters could be composed using the "merge" or "form letter" function on a word processor.

The following are hardware dealers or manufacturers in the Portland area. (This list was compiled November 1982.) This is not intended as a complete list nor an endorsement of the companies named.

HARDWARE

Burroughs Corporation
6755 SW Sandburg Street
Tigard, OR 97223
639-9660

Byte Shop
3482 SW Cedar Hills
Beaverton, OR 97005
644-2686

Byte Shop
2033 SW 4th Street
Portland, OR 97201
223-3496

Computer Exchange
11507 SW Pacific Hwy.
Tigard, OR 97223
245-1020

Computerfutures
2092 E Main Street
Hillsboro, OR 97123
640-1729

Computerland
12020 SW Main
Tigard, OR 97223
620-6170

Computer Maintenance Ctr.
Service Inc.
8700 SW 26th
Portland, OR 97219
245-3301

D.P. Enterprises, Inc.
4811 SE 16th Ave.
Portland, OR 97202
238-0397

Heathkit Electronic
516 SE Chkalov Dr. No.
Vancouver, WA 98664
(206) 254-4441

Honeywell Information
Systems, Inc.
6420 SW Macadam Ave.
Portland, OR 97201
245-0721

IBM Corporation
National Marketing Div.
500 NE Multnomah St.
Portland, OR 97232
248-2668

Northwest Computer
Support
3486 SE Cedar Hills
Beaverton, OR 97005
644-5080

SOFTWARE

Columbia Software
555 SW Viewcrest Drive
Gresham, OR 97030
667-5898

Computer Exchange
11507 D SW Pacific Hwy.
Pacific Terrace
Shopping Center
Tigard, OR 97223
245-1020

Computer Products
Unlimited, Inc.
3477 NE Yeon Avenue
Portland, OR 97210
222-2226

Data Management
Consultants
230 SW First Street
Portland, OR 97201
227-0051

Germond Systems, Inc.
P.O. 387
Beaverton, OR 97075
646-0980

Optimum Systems, Inc.
11600 SW Barnes Road
Portland, OR 97225
641-0100

MATERIALS REQUIRED: For additional companies, see your phone book or current computing magazine advertisements.

ADDITIONAL RESOURCES:

Encyclopedia Britannica Educational Corporation, "Computers in Our Society," cassette and filmstrip series (computer careers).

Frank, Discovering Computers, pages 40-41.

Squire, The Computer, pages 95-104.

Spencer, Exploring the World of Computers, pages 67-72.

Wood, Computer Awareness, pages 144-160.

2.1.7
Reference No.

ACTIVITY TITLE: Careers In Computers

OBJECTIVE: List examples of careers created directly by the computer industry (programmer, system analyst, data processing, maintenance).

GRADE LEVELS:	K-3	4-6	7-8	9-12
				*

DESCRIPTION: In this activity, students are to match career titles and job descriptions.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

Encyclopedia Britannica Educational Corporation, "Computers in Our Society," cassette and filmstrip series (computer careers).

2.1.7

CAREERS IN COMPUTERS

Name ______________________________ Period__________ Date__________

Match the Following:

_____ 1. Data Entry Operator

_____ 2. Operations Manager

_____ 3. Field Service Engineer

_____ 4. Computer Operator

_____ 5. Systems Analyst

_____ 6. Data Processing

_____ 7. Computer Programmer

_____ 8. Technician

_____ 9. Microcomputer

_____10. Computer Consultant

_____11. Computer Programming Inst.

_____12. Documents Librarian

_____13. Systems Analysis

_____14. Data Processing Manager

A. a person who specializes in computer applications for business and offers guidance to clients who own companies.

B. the process of analyzing existing systems for the purpose of evaluating possible improvements in methods and procedures.

C. a person who teaches people what computers are and how to use them.

D. a computer no larger than a typewriter, sometimes called a personal computer. Also, a computer system commonly consisting of a TV-like screen with a keyboard.

E. a person who transcribes data into computer readable format.

F. a person who supervises the repair, updating, and modification of customers' computer equipment.

G. a person who operates the computer system.

H. a person who is in charge of and manages a data processing department.

I. a person who writes programs that enable a computer to do task.

J. a person responsible for supervising the day-to-day processing on a computer.

K. the computer system, programming, and operation.

L. a person responsible for the document creating and storage from the computer.

2.2.1
Reference No.

ACTIVITY TITLE: Do You Use A Computer?

OBJECTIVE: The student will list examples of careers affected indirectly by the computer industry.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*		

DESCRIPTION: The student will interview persons to see if they use computers in their jobs. Have students list all the jobs which they found use the computer.

EXTENSION: Make a chart of all occupations using computers.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

2.2.1

DO YOU USE A COMPUTER?

Instructions: Using the following questionnaire, interview people you know to see if they use computers in their jobs.

Job? ______________________________

1. Do you use computers in your work? __ yes __ no
2. What computer do you use? ______________________________
3. For what purpose do you use computers?

   ____

   ____

4. What training did you need to have to use computers in your job?

   ____

Job? ______________________________

1. Do you use computers in your work? __ yes __ no
2. What computer do you use? ______________________________
3. For what purpose do you use computers?

   ____

   ____

4. What training did you need to have to use computers in your job?

   ____

Job? ______________________________

1. Do you use computers in your work? __ yes __ no
2. What computer do you use? ______________________________
3. For what purpose do you use computers?

   ____

   ____

4. What training did you need to have to use computers in your job?

   ____

2.2.2
Reference No.

ACTIVITY TITLE: Panel Discussion

OBJECTIVE: The student will list examples of careers affected indirectly by the computer industry.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Invite a guest panel which includes persons working in occupations not thought to use the computer. Have a discussion on how each occupation uses the computer.

EXTENSION: Use this activity to discuss that computer related skills are rapidly becoming requirements for a wide variety of careers.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Casady, Word Processing Concepts, pages 161-176.

Wood, Computer Awareness, pages 160-167.

2.2.3
Reference No.

ACTIVITY TITLE: Interview Of Related Jobs

OBJECTIVE: The student will list examples of careers affected indirectly by the computer industry.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Students are to interview persons whose occupations are indirectly affected by the computer to find out how the computer affects their jobs.

A class brainstorming session on possible questions to ask would help students in conducting a more productive interview. (See section 2.1.5 for a list of sample questions.)

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Casady, Word Processing Concepts, pages 161-176.

Wood, Computer Awareness, pages 160-167.

CIS (Career Information System) available from North Clackamas #12 Computer Center.

2.3.1
Reference No.

ACTIVITY TITLE: Field Trip

OBJECTIVE: The students will describe careers offered by local businesses that make use of computer equipment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Visit nearby businesses that make use of computer equipment. Before going, have students discuss possible items to notice while there, such as types of equipment used, whether the occupations are machine or people centered, the ratio of male/female employees and what position they have, and their feelings of the general work environment.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

2.3.2
Reference No.

ACTIVITY TITLE: Guest Speakers

OBJECTIVE: The student will describe careers offered by local businesses that make use of computer equipment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Arrange for local parent or computer professionals to come in to speak to the class. After someone has agreed to speak to the class, be sure to have some sample questions prepared for them. The sample questions could come from class discussion.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

2.3.3
Reference No.

ACTIVITY TITLE: Contact Employment Agency

OBJECTIVE: The student will describe careers offered by local businesses that make use of computer equipment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
				*

DESCRIPTION: Students contact employment agencies to learn about job opportunities using computers and to obtain additional career planning information. After contact is made, students can either make an oral or written presentation.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

2.4.1
Reference No.

ACTIVITY TITLE: College And Career Information Directory

OBJECTIVE: The student will describe skills required for computer related careers (courses recommended).

GRADE LEVELS:	K-3	4-6	7-8	9-12
				*

DESCRIPTION: Write to two or more colleges which offer computer science programs. Compare lists of course requirements.

EXTENSION: This could be extended to a class project using the "merge" or "form letter" functions of a word processing project. Then, individual students could compare the lists of course requirements.

The following list gives only some of the 4-year colleges. It is not intended as an endorsement or a complete list.

Eastern Oregon State College
La Grande, OR 97850

Oregon State University
Corvallis, OR 97331

Southern Oregon State College
1250 Siskiyou Blvd.
Ashland, OR 97520

George Fox College
414 N. Meridian Street
Newberg, OR 97132

Reed College
3203 SE Woodstock Blvd.
Portland, OR 97202

Willamette University
900 State Street
Salem, OR 97301

Oregon Institute of Technology
Klamath Falls, OR 97601

Portland State University
PO Box 751
Portland, OR 97207

University of Oregon
Eugene, OR 97403

Lewis and Clark College
0615 Sw Palatine Hill Rd.
Portland, OR 97219

University of Portland
5000 N. Willamette Blvd.
Portland, OR 97203

MATERIALS REQUIRED:

ADDITIONAL RESOURCES: Counselors
College catalogs
CIS (Career Information System) available from North Clackamas #12 Computer Center

2.4.2
Reference No.

ACTIVITY TITLE: Data Processing Aptitude Test

OBJECTIVE: The student will describe skills required for computer related careers.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Complete a simulated test of data processing aptitude.

MATERIALS REQUIRED: Attached test for each student

ADDITIONAL RESOURCES:

Key: I.

A.	b.	20	The number is increased by 2.
B.	c.	5	The number is decreased by 3.
C.	d.	16	The pattern adds 2, then adds 3.
D.	a.	5	The pattern decreases by 1, then 2, then 3, etc.

II.

1.	5
2.	2
3.	4
4.	4
5.	4
6.	3
7.	2
8.	2

DATA PROCESSING

Aptitude Test

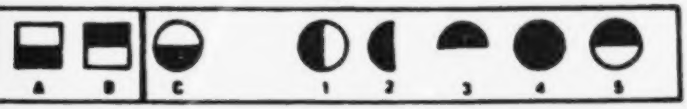
Instructions: Below is an aptitude test designed to test your ability to do computer programming. Circle the answer to each question.

I. The numbers in each series below follow a certain rule. For each series of numbers, you are to find the correct rule and select one of five possible answers that would complete the pattern.

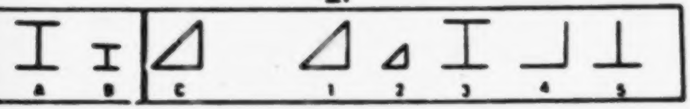
						(a)	(b)	(c)	(d)	(e)
A.	10	12	14	16	18	19	20	21	22	23
B.	20	17	14	11	8	3	4	5	6	7
C.	4	6	9	11	14	12	13	15	16	17
D.	20	19	17	14	10	5	6	7	8	9

II. Find the rule or rules by which A is changed to B. Decide how C is to be changed to make one of the figures on the right side of the test.

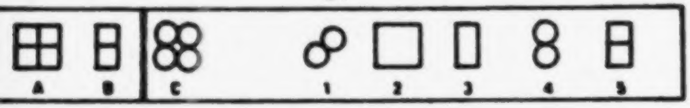
1.



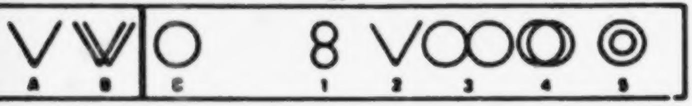
2.



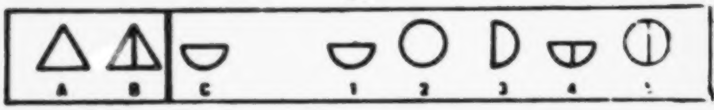
3.



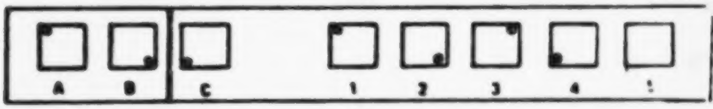
4.



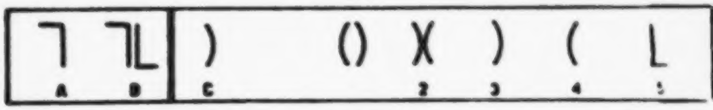
5.



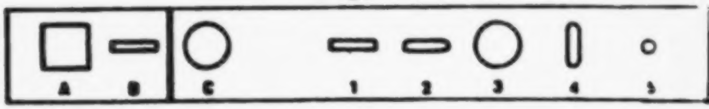
6.



7.



8.



Used by Permission of Computer Career Institute (Walter Peterson).

2.4.3
Reference No.

ACTIVITY TITLE: Career Information System (CIS)

OBJECTIVE: The student will describe skills required for computer related careers (courses recommended).

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Use CIS to gather information on computer careers.

See related activity 3.2.2.

MATERIALS REQUIRED: CIS Computer System

ADDITIONAL RESOURCES: Counselors
College catalogs

2.5.1
Reference No.

ACTIVITY TITLE: Compiling Data

OBJECTIVE: The student will describe changes made in jobs because of the computer.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Have students compile data by hand and by computer. Compare the differences (time, accuracy, etc.) and show that this is why many jobs have changed because of the computer. A possible demonstration would be to have student handwriting a paragraph, another student typing it on a regular typewriter, another student typing on an electronic typewriter, and another student on a word processor. The paragraph copied should be the same.

EXTENSION: Field trip to either a bank or county courthouse to look at differences in records over a period of time. Noting handwritten copy, manual typewriter copy, electric typewriter copy, and then microfilm copy.

EXTENSION: Have students take a five question survey on a subject of their choice. Students collate and compare the data, then, if you have access to software, have the computer do the same. Discuss the amount of time saved by using the computer.

MATERIALS REQUIRED: Paper
Manual typewriter
Electric typewriter
Electronic typewriter
Word processor
Clock or stop watch

ADDITIONAL RESOURCES: See related activity 3.3.2.

2.5.2
Reference No.

ACTIVITY TITLE: Guest Panel

OBJECTIVE: The student will describe changes made in jobs because of the computer.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Invite a guest panel which includes several people who have been in their career field for 10 years or more. Discuss changes made in their job tasks because of the computer.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

2.6.1
Reference No.

ACTIVITY TITLE: Career - Task Match

OBJECTIVE: The student will be aware that computer-related skills and experience will rapidly become requirements for a wide variety of careers.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Generate a discussion of how any career might use computers without the user being a computer "expert". Use the following activity worksheet. Students could further research the careers to find out specific responsibilities for each of the careers.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: SVE Basic Skill Booster filmstrip series,
Computer Awareness,
"Everyday Computers".

Possible answers to activity sheet:
1E 2G 3B 4J
5K 6T 7C 8O
9M 10A 11P 12F
13Q 14R 15S 16N
17H 18L 19I 20D

2.6.1

CAREER - TASK MATCH

Computers may affect your work, no matter what career you choose. Match the career with the appropriate computer task.

		CAREER		COMPUTER TASK
____	1.	Secretary	A.	Provides Locations
____	2.	Teacher	B.	Plan Menu
____	3.	Homemaker	C.	Studies Movement
____	4.	Store Manager	D.	Computes Bids
____	5.	Dietician	E.	Compute Payroll
____	6.	Personnel Manager	F.	Compiles Balance Sheets
____	7.	Dance	G.	Control Inventory
____	8.	Engineer	H.	Sort Mail
____	9.	Policeman	I.	Secure Areas Against Theft and Vandalism
____	10.	Dispatcher	J.	Operate Word Processor
____	11.	Accountant	K.	Record Grades
____	12.	Clerk	L.	Plans Route
____	13.	Race Driver	M.	Retrieve License Information
____	14.	Doctor	N.	Computes Statistics
____	15.	Newspaper Reporter	O.	Design Buildings
____	16.	Coach	P.	Computes Taxes
____	17.	Postman	Q.	Control Fuel
____	18.	Delivery Man	R.	Diagnose Illness
____	19.	Security Guard	S.	Write Copy
____	20.	Contractor	T.	Balance Checkbook

2.6.2
Reference No.

ACTIVITY TITLE: Brainstorming Careers

OBJECTIVE: The student will be aware that computer-related skills and experience will rapidly become requirements for a wide variety of careers.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Have the students brainstorm a list of careers or jobs. List these on the board as the students name them. Analyze each job or career to determine whether it has been computerized or will be in the future.

MATERIALS REQUIRED: Blackboard or chart

ADDITIONAL RESOURCES: SVE Basic Skill Booster filmstrip series, Computer Awareness.
"Everyday Computers".

2.6.3
Reference No.

ACTIVITY TITLE: Panel Discussion

OBJECTIVE: The student will be aware that computer related skills and experience will rapidly become requirements for a wide variety of careers.

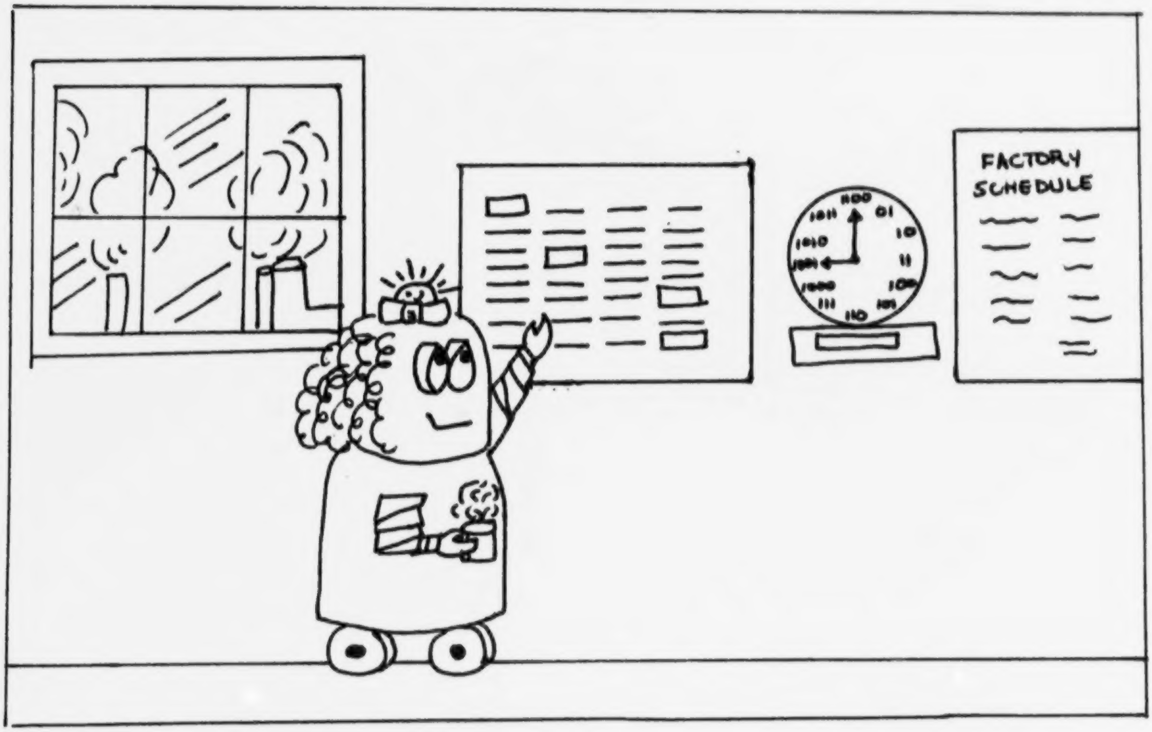
GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Invite a guest panel which includes persons working in occupations not thought to use the computer. Have a discussion on how computer related skills and experiences will rapidly become requirements for a wide variety of careers. Use in conjunction with 2.2.2.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

3.0


FACTORY SCHEDULE
1100
01
10
11
100
101
110
111
1000
1001
1010
1011

SCOPE AND SEQUENCE

The X indicates instruction for that level should occur.

3. The student will learn about the use of computers at home, school, and work.

The student will:	K-3	4-6	7-8	9-12
3.1 Describe current uses of computers in the home (record keeping, entertainment, protection, communications, and automation).	X	X	X	X
3.2 Describe how the computer is currently used in the school for administrative and instructional purposes (CIS, attendance, library access, drafting, graphic arts, simulation, word processing).	X	X	X	X
3.3 Describe current uses of computers in business and industry (collecting and processing data, decision-making, robotics, word processing).		X	X	X
3.4 Describe current uses of computers in government (census taking, decision making and planning, law enforcement, tax collection, public opinion polls, mail, mapping, space exploration and development, research and development).		X	X	X
3.5 Describe current computer trends in entertainment (movies, TV video, music, art).	X	X	X	X
3.6 Discuss the potential effects of computer use in the home, school, and work environment.		X	X	X
3.7 List the criteria for determining the need for computer equipment in given applications.			X	X
3.8 List examples of computer applications which are invisible to the general public.		X	X	X
3.9 Develop a questioning attitude toward errors in computer output ($3,462 monthly water bill).		X	X	X

3.0.1
Reference No.

ACTIVITY TITLE: How Computers Are Being Used

OBJECTIVE: The student will learn about the uses of computers at home, school, and work.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: A True-False Quiz to introduce or review computer usage. This could be used as a discussion generator.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: Are You Computer Literate?

Suggested key to activity:

1. T
2. F
3. F
4. T
5. T
6. F
7. F
8. T
9. T
10. F

COMPUTER USES

How Computers Are Being Used

Check yourself to see how much you already know about general uses of computers.

T F 1. Most school districts make considerable use of computers.

T F 2. Computer simulations are fun to do but are usually not helpful to anyone.

T F 3. Most computer time is spent in just doing mathematics.

T F 4. Some doctors use computers now to help diagnose a patient's illness.

T F 5. A formula such as A = B X H could be considered a mathematical model.

T F 6. Major airlines haven't started using computers yet.

T F 7. Information retrieval is the largest general use of computers.

T F 8. Computers can be used to produce pictures.

T F 9. Information retrieval could involve looking up the prices of grocery items if they are marked with the Universal Product Code.

T F 10. Full text searching is generally done by a microprocessor, with the text being stored on a cassette tape.

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From: Are You Computer Literate?, page 67.

3.0.2
Reference No.

ACTIVITY TITLE: Computers And Gorillas!

OBJECTIVE: The student will learn about the uses of computers at home, school, and work.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: A multiple-choice questionnaire to review the topics discussed relating to computer usage.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: Are You Computer Literate?

Key: "A Harry Reasoner"

3.0.2

COMPUTERS AND GORILLAS!

What do you get when you cross a computer with a gorilla?

```
" --    -- -- -- -- --    -- -- -- -- -- -- -- -- "
  6        6  1  1  5     1  4  6  2  3  7  4  1
```

Select the best answer for each of the multiple choice questions, then write the letter in the space provided. Then, put your answers on the corresponding numbers above.

____1. Student class schedules prepared by computer: (r) save administrative time and reduce scheduling conflicts; (s) make better teaching possible; (t) permit schools to accept more students.

____2. A researcher who has direct access to computer stored information will get: (r) answers to all of his or her questions; (s) immediate reference to the information; (t) improved working conditions.

____3. Most computers understand programs written in: (m) our natural English language; (n) any programming language; (o) specific programming language.

____4. Data processing jobs performed by computers for business: (d) must be very simple; (e) may be simple or complex, with endless variety; (f) must be related to sales or cash payments.

____5. One of the drawing and model displaying tools is the: (x) storage or memory device; (y) graphics terminal; (z) central processing unit.

____6. A computer program for a mathematical model is called: (a) a computer simulation; (b) a computer library; (c) artificial intelligence.

____7. The use of terminals to get information from a computerized data bank is called: (m) artificial intelligence; (n) information retrieval; (o) computer simulation.

____8. Full text searching refers to: (f) the process librarians use to to retrieve lost books; (g) a student studying for a final exam; (h) the computer looking over entire articles for desired words or phrases.

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From: Are You Computer Literate?

3.1.1
Reference No.

ACTIVITY TITLE: Computer Scavenger Hunt

OBJECTIVE: The student will describe current uses of computers in the home.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	*

DESCRIPTION: Students will "hunt" for computer applications in the home by collecting pictures of uses or writing descriptions of uses with an accompanying sketch.

Discussion of what is a computer application and possible classifications of examples are provided.

MATERIALS REQUIRED:
- Bulletin board
- Category headings for bulletin board
- Hand out - "Computer Scavenger Hunt"
- Hand out - "Computer Score Sheet"
- Newspaper

ADDITIONAL RESOURCES:

Ball and Charp; Be a Computer Literate, pages 46-58.

Heller, Martin; Bits 'N Bytes About Computing, A Computer Literacy Primer, pages 93-114.

Spencer; Exploring the World of Computers, pages 13-22.

Frank; Discovering Computers, pages 42-43.

Computers in Our Society, Encyclopidia Britannica Educational Corporation filmstrip series no. 17185K.

COMPUTER SCAVENGER HUNT

Directions

Background: Computer applications are becoming common in the home. This activity will give students an opportunity to focus on how computers are being adapted to home use. Have students look for examples of computer "technology", not just a computer. Thus, devices that make use of integrated circuits, such as microwaves and wrist watches, would be included. Sales descriptions usually mention these innovations.

Procedure: First, discuss with your students about computers in the home. Gear the questions to the age level and experience of the class. Some discussion points:

1. What is a computer?
2. When did you first see many computer applications in the home?
3. What ads on TV and radio talk about computer using products?
4. Have you bought any products that use computer technology?
5. What computer product would you like to buy?

After the discussion topics, challenge your students to find clippings of products for the home that use computer technology. If a student has an application but no clipping, have him/her write a short description and sketch of the product. Set a time limit and other rules to satisfy your class needs.

Prepare a bulletin board to display the pictures brought in. Possible categories might be: record keeping, entertainment, protection, communication, automation. Reserve room for "other"!

As the students bring in the information, post them on the bulletin board under the proper heading and list the product and contributor on the Score Sheet. Any questions about whether some item is using computer technology or what categories are open for discussion.

COMPUTER SCAVENGER HUNT

Score Sheet

	ITEM	PERSON
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		
20.		
21.		
22.		
23.		
24.		
25.		
26.		
27.		
28.		
29.		
30.		
31.		
32.		
33.		
34.		
35.		
36.		
37.		
38.		
39.		
40.		
41.		
42.		
43.		
44.		
45.		
46.		
47.		
48.		

3.1.2
Reference No.

ACTIVITY TITLE: Guest Speaker - Home Use

OBJECTIVE: The student will describe current uses of computers in the home.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Invite representatives of electronic oriented companies (Radio-Shack, Atari, TI, video cassette supplies) to demonstrate products to your class. Discuss history of the company, current status, and possible future products.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES: See related activity 2.1.6.

3.1.3
Reference No.

ACTIVITY TITLE: Personal Use Survey

OBJECTIVE: The student will describe current uses of computers in the home.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	

DESCRIPTION: Brainstorm survey questions (see sample). Send letter and survey, complete results, and discuss with students. See related activities 2.5.1 and 3.2.1.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Example: Class purpose is to survey the use of computers in the home.

Sample Letter:

This will
vary from
year to year.

Month, day, year

Mr. and Mrs. J.R. Lampe
18903 S.E. Green
Lake Oswego, OR 97034

This will
vary from
student to student

Dear Parents:

We're learning about the computer at school. As part of this experience, we would like to find out how many different ways you use the computer daily. Please answer the following questions and return them to the school office by month, day, year.

This will vary
from year to year

Thanks a lot.

Your Son, Daughter

This will vary
from student to student

3.1.3

PERSONAL USE SURVEY

( ) Check if you use these regularly.

1. ( ) Microwave
2. ( ) Telephone
3. ( ) Word Processor
4. ( ) Computer - Kind ________________________ (fill in blank)
5. ( ) Security System
6. ( ) Traffic Lights
7. ( ) Game Playing
8. ( ) Home Business Management (bills, recipes, taxes, etc.)
9. ( ) Cable T.V. System
10. ( ) Other (specify) ______________________

3.2.1
Reference No.

ACTIVITY TITLE: Word Processing Investigation

OBJECTIVE: The student will describe how the computer is currently used in the school for administrative and instructional purposes.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	*

DESCRIPTION: Write and edit a form letter as a class in which blanks will be replaced with the specific items of each student. The purpose of this activity is to help students understand the way a word processor works.

STEPS IN WORD PROCESSING INVESTIGATION

The teacher should become familiar with the operation and function of a word processor. Check with your school secretaries to see if one is available. Otherwise, contact your local high school, administration, or a business for possible access.

I. Discuss with students:

   A. How the computer is currently used (specifically for word processing).

   B. The purpose of the letter:

      1. Survey of business in the area (see 3.3.2 for sample),
      2. Survey of parents (see 3.1.3 for sample),
      3. Progress report to parent,
      4. Request for support or information of some kind,
      5. Any other determined by class.

   C. The content of the letter (see sample 3.1.3).

   D. The form of the letter.

   E. The parts of the letter that will vary:

      1. Sent to whom,
      2. Content specific to recipient (what, whom),
      3. Received from whom.

II. Edit together in class (could use word processor in the group activity).

III. Allow each student to print a letter inserting his/her specific details using a word processor.

MATERIALS REQUIRED: Paper
Pen/pencil
Word processor, or access to word processor or computer that will function as a word processor

ADDITIONAL RESOURCES: Computers In Our Society, Encyclopedia Britannica Educational Corporation (filmstrips) series #17185K

Suggested possible word processors:

For Apple:

Apple Writer - Apple II (grades 7-12)
Bank Street Writer, (grades K-12)
Apple Writer - Apple IIE, (grades 8-12)
Screen Writer II, (grades 7-12)

For Pet:

Word Pro (grades 7-12)
Paper Mate (grades 7-12)

Stand Alone Processors

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3.2.2
Reference No.

ACTIVITY TITLE: Career Information System

OBJECTIVE: The student will describe how the computer is currently used in the school for administration and instructional purposes.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Discuss careers and go through any available brochures pertaining to the CIS program. Then have the student run the CIS program (Career Information System). This activity may be done several times.

MATERIALS REQUIRED: Paper/pencil
Career booklets
Computer terminal with access to career information system

ADDITIONAL RESOURCES: See related activity 2.4.3.

3.3.1
Reference No.

ACTIVITY TITLE: Decoding Bar Codes

OBJECTIVE: The student will describe current uses of computers in business and industry.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: Have students collect as many different kinds of labels that have bar codes as possible. Compare and contrast bar codes. The student should realize that each company has one number. Also, each food item has a code number.

Universal Product Codes are expressed by using bar codes.

EXTENSION: Contact a Clackamas County librarian for information on library use of bar code.

MATERIALS REQUIRED: Paper/pencil
Copy of attached worksheet "Decoding Bar Codes"
Overhead transparency of worksheet

ADDITIONAL RESOURCES: The Computing Teacher, Vol. 8, No. 4, page 12.

My Friend the Computer, Jean Rice, page 20.
T.S. Denisons and Co., Inc.

Scientific American, September 1982.

DECODING BAR CODES

Most grocery store items are labeled with a bar code, designed to be read by a laser device. Usually the numerical values represented by the bar code are printed below the bars. Each major food processing company in the United States has a code number, and each good it produces has a code number. Thus, when this information is input to a computer, it can "look up" the current price and ring it up on the cash register.

Have students collect labels containing bar codes from a large variety of food items. Help them to discover that each company has a unique number, and that different food items from a company have different numbers.

Discuss with the students how the bar code helps the grocery checkout clerk do his/her job, and other possible applications such as inventory control and daily sales analysis. Discuss advantages of having such a checkout system in a store. For example, a clerk using this machinery may require less training and experience than one using less sophisticated equipment, and consequently receive a lower rate of pay. A computer awareness activity such as this can easily lead to a serious discussion of the social consequences of computers.

From: The Computing Teacher, Vol. 8, No. 4, page 12.

NAME ______________________________

DECODING BAR CODES

FOOD ITEM	NAME OF COMPANY	CODE NUMBER

3.3.2
Reference No.

ACTIVITY TITLE: Survey Of Business Use

OBJECTIVE: The student will describe current uses of computers in business and industry.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Write letters to various businesses making a survey of uses. This is set up to use a word processor. However, if you do not have access to one, it could be done without one.

MATERIALS REQUIRED: Paper
Pen/pencil
Sample letter and survey
Access to word processor
See activity for 3.2.1 "Word Processing Investigation"

ADDITIONAL RESOURCES:

Introduction to Data Processing (filmstrip) Part I, Educational Audio Visual Inc., Pleasantville, NY 10570.

Computers in Our Society, Encyclopedia Britannica Educational Corporation, filmstrip series no. 17185K.

SURVEY OF BUSINESS USE

Sample Letter:

June 22, 19--

Wang Laboratories
9500 SW Barbur Blvd.
Portland, OR 97219

Ladies and Gentlemen:

We are studying about business use of computers. As part of our study, we have developed the enclosed survey form. Could you help us in our study of computer use by answering the questions on the survey and returning it to us by Wednesday, June 30, 1983.

Thank you for helping us understand more about business and computers.

Sincerely,

Ezra Student

* *

This is a sample letter using word processing format of variables:

tdatet

tgendert tfnamet tlnamet
taddrt

Dear tgendert tlnamet:

We are studying about business use of computers. As part of our study, we have developed the enclosed survey form. Could you help us in our study of computer use by answering the questions on the survey and returning it to us by tdayt, tdatet.

Thank you for helping us understand more about business and computers.

Sincerely,

tstudent namet

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SURVEY OF BUSINESS USE OF COMPUTERS

Do you use computers? ____Yes _____No

If yes, please mark ("X") any items which apply. If no, skip to "Plans for Future Use."

Kind of Computer

____Terminal

____On site (micro, ect.)

Number of Computers

____ 0 - 3 machines

____ 3 - 10 machines

____Over 10 machines

Operation of Computers

____Available to all employees

____Less than 5 employees use

____ 5 - 10 employees use

____10 - 20 employees use

____We train employees in use

____Employee must have special background

Uses of Computers

____Collecting and processing data

____Decision making

____Word processing

____Robotics

____Other (specify)______________

Plans for Future Use

____Don't intend to use computers

____Will be using computers soon

____May be using computers eventually

____Plan to expand our use (specify)

____

____Our current use of computers is satisfactory

3.4.1
Reference No.

ACTIVITY TITLE: Finding Information

OBJECTIVE: The student will describe current uses of computers in government.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	*

DESCRIPTION: Students will become part of a data base and then will become actively involved in a search. Students will experience how police find suspects and how other information can be found in a large information file.

EXTENSION: Use old telephone directories.

MATERIALS REQUIRED: 3" x 5" cards (one for each student)
Pencils or pens (one for each student)

ADDITIONAL RESOURCES: From, The Computing Teacher, Vol. 9, No. 2, pages 19 and 20.

FINDING INFORMATION - ACTIVITY

1. Some of the ideas of a data base and/or policy information retrieval system can be illustrated by the following activity. Have each student in the class fill out a card not containing the student's name, but listing the following information.

   a. Sex
   b. Height; rounded to nearest 2 cm.
   c. Weight; rounded to nearest kg.
   d. Age; rounded to nearest year
   e. Hair color

   Unless there are identical twins (or triplets) in the classroom, it is highly unlikely that two students have exactly the same data.

   Now take the entire set of cards and select one at random. Have all members of the class stand up. Then go through the list of the one student's data, one item at a time, directing students who don't satisfy the description item to sit down. For example, suppose the card you selected was a female of height 96 cm. You would first direct all males to sit down. Then direct all people of height 94 cm or less, or height 98 cm or more, to sit down. Continue the process until only one person remains standing. You have identified this person from the descriptive data!

   Data sets like this can be used for a number of activities. Consider the problem of finding the two students in the class who are most nearly the same. Suppose no two are exactly the same. How can you define "most nearly the same" in a manner that will allow the data base to be used to solve the problem? The police may have a partial description of a suspect, or several descriptions that don t exactly agree. How can you examine their files to find the names of people who approximately fit the description? Set the class to work on these questions.

2. A telephone book contains information like one might find in a computerized data base information retrieval system. With the aid of your students and/or fellow teachers, you can collect enough old phone books so that each class member will have one. Students can learn:

   * How to look up a phone number.
   * How to look up an address.
   * What an unlisted number is.
   * About the problem of people having identical names.
   * What is in the Yellow Pages.

   Suppose you know a person's phone number but not their name. Is a phone book a useful aid to finding the name? Would it help if the phone book were computerized?

3.4.2
Reference No.

ACTIVITY TITLE: Government Speaker

OBJECTIVE: The student will describe current uses of computers in government.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Invite someone in government to be a guest speaker in the classroom. Tell him/her the specific focus for the presentation.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES: Possible speakers could be found from the following:

U.S. Forest Service - Region #6 Office or Mt. Hood National Forest
County Data Processing
County Library
City Government Offices

3.4.3
Reference No.

ACTIVITY TITLE: Government Field Trip

OBJECTIVE: The student will describe current uses of computers in government.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Visit any government offices available. Some possibilities are the U.S. Forest Service, Count Data Processing, County Library, and City Government Offices.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES: Clackamas County Data Processing Center
121 Library Ct.
Oregon City OR 97045
(Off Warner-Milne Road in County Offices)

3.5.1
Reference No.

ACTIVITY TITLE: Computer Block Graphics

OBJECTIVE: The student will describe current computer trends in entertainment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*			

DESCRIPTION: Have students color the blocks as indicated. The block pictures may be extended as suggested on the activity extension 3.5.1.

MATERIALS REQUIRED: Student activity worksheet
Colored pens or pencils

ADDITIONAL RESOURCES: TCT, Vol. 9, No. 2, page 20.

COMPUTER GRAPHICS

Many of the "pictures" that we see every day are actually made up of a series of dots. Pictures in newspapers, if inspected wth a magnifying glass, are a series of neatly ordered dots. TV screens are also dot oriented as well as many of the scenes shown on the tube. Pictures relayed through space are made up of dots. Also, the smaller the dot the better the resolution, or the clearer the picture appears. Computer graphics, in most cases, also makes use of dots to create images. The activity below explores these ideas.

1. Collect a few samples of newspaper clippings and have the students look at them with a magnifying glass. Discuss observations of the pictures from 5 to 10 feet. How do the dots differ?

2. Get a dot to dot booklet and have each student do one of the puzzles. Discuss how straight lines can be used to show a curved object. Also look at the idea of sequence, the order in which the points are put together.

3. Make copies of the attached sheet with six circles. Have the students evenly space 4 points around the circle and then conncet them in order with straight lines. Repeat with the other circles and use 6, 8, 10 and more dots, respectively. Discuss when the straight line "circles" look like a circle. How many dots are needed to give the appearance of a circle?

4. All students are familiar with connect-the-dots activities. A picture is formed by connecting the dots in numerical order. Students can create their own connect-the-dots activities and thereby learn some of the ideas underlying computer graphics.

   All that is needed is a picture, perhaps a simple line drawing, and a piece of tracing paper. The tracing paper is placed over the picture. Points are selected and indicated on the tracing paper. They are numbered in the order in which they are to be connected. It is assumed that straight lines will be used to connect successive points.

   The resulting picture can be made better by drawing in on the tracing paper some of the parts of the picture that are not easily formed by connecting dots. Because dots must be connected in a specified order, without raising the pencil off the paper, there are several limitations to the quality of the picture.

   One can enhance the quality of the picture by allowing students to place a U or a D in front of some numbers. When the drawer comes to a number preceeded by a U, s/he lifts the pencil off the paper. The pencil continues that way until one comes to a number preceded by a D. The pencil is then lowered down onto the paper.

5. Older children are familiar with plotting points on graph paper, or can easily learn to do this. This allows a more computerlike appproach to the connect-the-dots activity. Now the idea is to give a list of coordinates of points that are to be connected. A small sample is given below.

    0. Start at (0, 0)
    1. Raise Pencil
    2. Move to (3, 2)
    3. Lower pencil
    4. Move to (3, 7)
    5. Move to (3, 5)
    6. Move to (7, 7)
    7. Move to (7, 2)
    8. Raise pencil
    9. Stop

   As in Activity 4, students can create these sets of directions. One begins with a picture on graph paper (or place a very thin piece of graph paper over a picture). The coordinates to be connected are then read off the graph paper and written down. Students will quickly find the value of using brief abbreviations. For example, the previous set of directions can be abbreviated as follows.

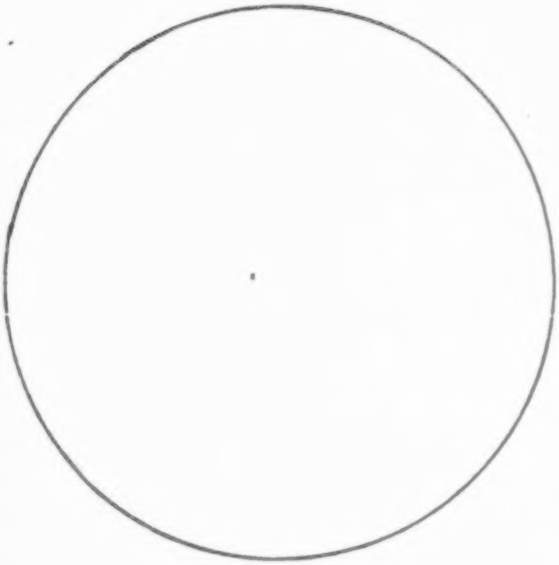
    0. Start (0, 0)
    1. U
    2. (3, 2)
    3. D
    4. (3, 7)
    5. (5, 5)
    6. (7, 7)
    7. (7, 2)
    8. U
    9. Stop

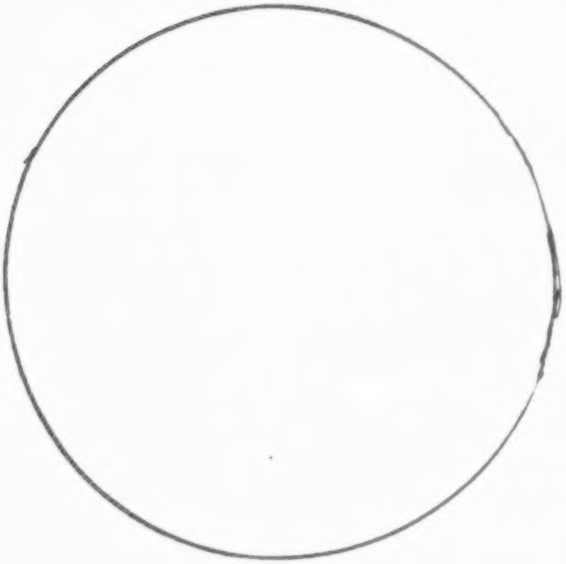
   In both Activity 4 and Activity 5, the idea is to have each student develop a set of directions. Students can then exchange papers and try out each other's set of directions. These sets of directions, especially the type developed for Activity 5, are much like computer programs.

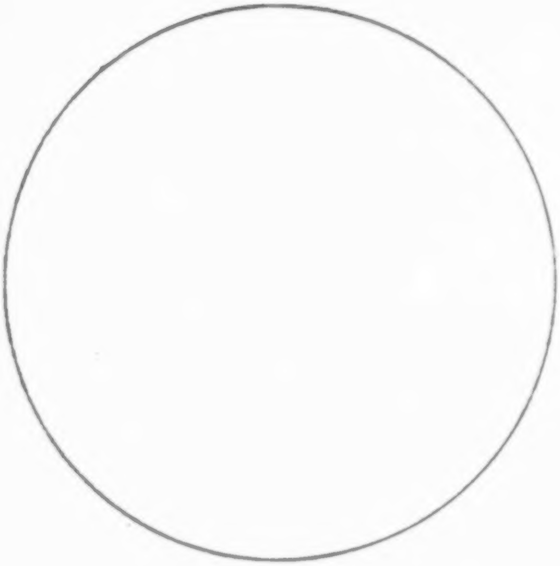
6. An inexpensive microcomputer system is apt to use a television set as an output display device. In addition to displaying alphabetic and numeric characters, such a system can display very small rectangles of light. Thus, a picture made up of a large number of lighted rectangles can be created and displayed. Elementary and middle school students can learn similar ideas by working with graph paper, shading in the squares to create a pattern or picture. For example, students can spell out their names using letters that are made by shading small squares. Have each student create a pattern or picture. Post some of them on the bulletin board.

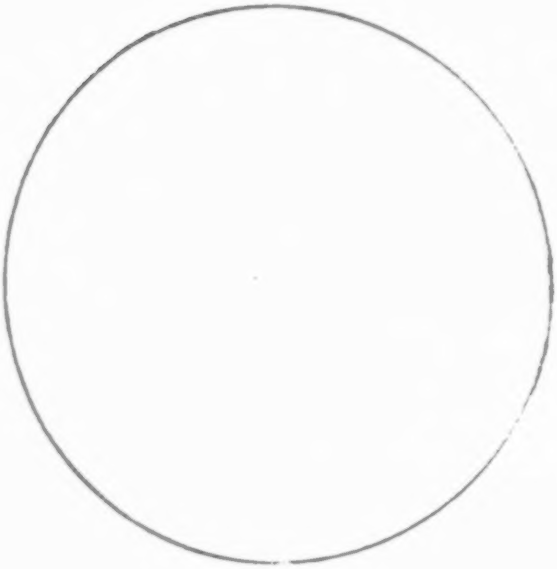
7. A typewriter can be used to create computer-like graphics. In typewriter graphics, one designs and types out a pattern or picture using just the typewriter character set. Varying shades of darkness can be formed by typing several different characters on top of each other.

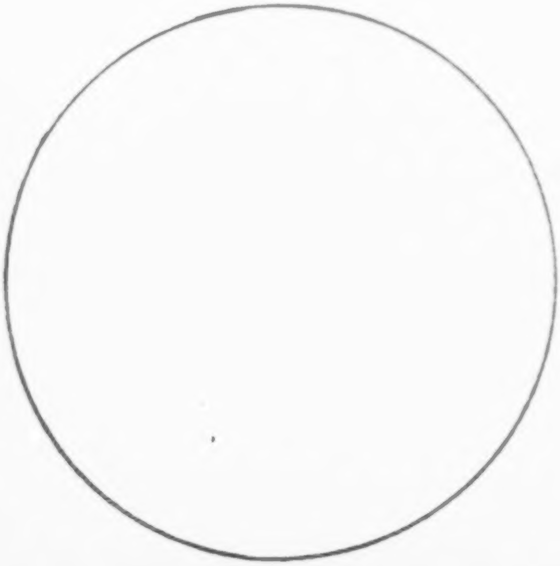
   Bring a typewriter to your classroom. An old manual typewriter will suffice. Illustrate typewriter graphics to your class, and then have each student design a graphic on graph paper. Finally, have students type their graphics and display them on a bulletin board.

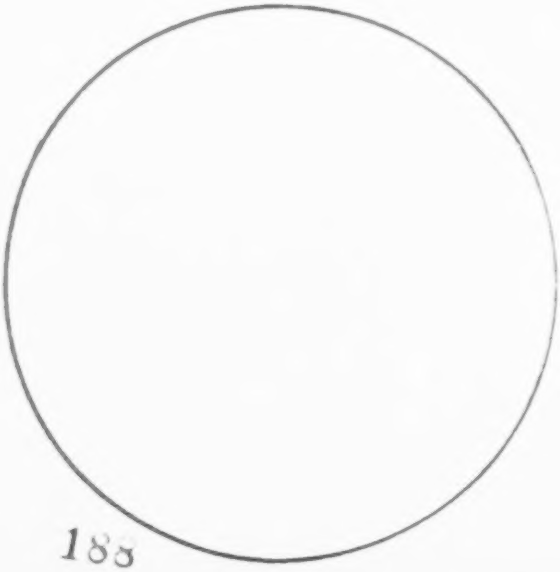












3.5.1

COMPUTER GRAPHICS BLOCK PICTURES

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32	33	34	35	36

Directions:

Color Block 1 Green
Color Block 2 Green
Color Block 3 Red
Color Block 4 Blue
Color Block 5 Green
Color Block 6 Green
Color Block 7 Green
Color Block 8 Red
Color Block 9 Blue
Color Block 10 Red
Color Block 11 Blue
Color Block 12 Green
Color Block 13 Red
Color Block 14 Blue
Color Block 15 Green
Color Block 16 Green
Color Block 17 Red
Color Block 18 Blue
Color Block 19 Blue
Color Block 20 Red
Color Block 21 Green
Color Block 22 Green
Color Block 23 Blue
Color Block 24 Red
Color Block 25 Green
Color Block 26 Blue
Color Block 27 Red
Color Block 28 Blue
Color Block 29 Red
Color Block 30 Green
Color Block 31 Green
Color Block 32 Green
Color Block 33 Blue
Color Block 34 Red
Color Block 35 Green
Color Block 36 Green

ACTIVITY EXTENSIONS OF 3.5.1

I. A. Have each student create an original block design and color it in on a grid numbered from 1 to 36.

B. Have each student write out the directions which will produce that design (i.e. color block 1 red, color block 2 blue, color block 3 green, etc.).

C. Have each student team up with a partner. Each team member follows the instructions produced by his/her partner from part (b) above.

D. Compare the "original" and the copy produced from the instructions. Did the "program" work?

II. A. Have each student produce an "original" as in I-A above.

B. Have each student reduce the original to a "secret Code" such as 1B2G3R4B.... Where "1B" means "color block a blue" and "2G" means "color block 2 green" etc. Be sure that students agree before hand on meaning of "B" so that "B" represents either blue or black or brown.

C. Complete activity as in I-C and I-D above.

III. A. Super challenge.....Have students create an original on a 10 x 10 grid (numbered from 1 to 100) and write the instructions in "secret code". Complete activity as before.

3.5.2
Reference No.

ACTIVITY TITLE: Video Games

OBJECTIVE: The student will describe current computer trends in entertainment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	

DESCRIPTION: An important goal of education is learning that one can learn and that skills are developed through practice. The students can readily see, through the playing of video games, that their skills become better. The students learn that their performance level can be increased through practice. Therefore, video games can aid in students' educational development.

Duplicate enough of the questionnaires on the following page for each person in your class. Instruct students to play at least one video game and evaluate it by completing the worksheet. If you have the computers available, this could be completed in school. If not, have students do it outside of school at an arcade or on a home computer.

When students return, have a discussion about the different video games and their educational value.

MATERIALS REQUIRED: Games for computer or
Video games or
Access to video games
Student activity worksheet

ADDITIONAL RESOURCES: TCT, Vol. 8, No. 6, page 41.

3.5.2

VIDEO GAMES

Name__________________________

Date__________________________

Instructions: As you play a video game of your choice, determine its educational value by answering the following questions.

1. Name of video game.

2. What do you do to get a high score or win this game?

3. How many things do you control?

4. How do you control them?

5. What decisions do you have to made as you play the game?

6. What skills are needed to play this game well?

7. How could you change this game to make it more educational?

3.5.3
Reference No.

ACTIVITY TITLE: The Computer In The Movies And TV

OBJECTIVE: The student will describe computer trends in entertainment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: A number of movies are now being created by computer and also many TV productions are assisted by the computer. Show examples of an older animation technique and computer animations. Then involve students in a discussion of the differences between the two.

EXTENSION: Use the included "TV Log" to have students identify computer use on shows they watch.

MATERIALS REQUIRED: Any of the Following:

1. Older Cartoons: "Yogi Bear", "Flintstones", "Jetsons", etc.
2. Current Cartoons: "Richie Rich", "Smurfs", "Happy Days", "Super Heros", etc.
3. Older Films: Science Fiction Films (old) KING KONG, etc.
4. New Films: TRON, STAR TREK, STAR WARS, WAR GAMES, SUPERMAN III, RETURN OF THE JEDI, etc.
5. "Computers in the Movies and on TV" on the following page.

ADDITIONAL RESOURCES: See TRON Retread, activity 3.5.6.

THE COMPUTERS IN THE MOVIES AND TV

Your students are constantly viewing examples of computer generated animation, especially in the last few years. With the introduction of "TRON" to the movie scene, computer animation will probably become common in movies. This activity will provide a historical viewing of different animation procedures and provide discussion ideas.

I. Older Movies -- Using Models

Show an old science fiction movie which has strange characters roaming across the screen and appears to use models of the creatures with different backgrounds. Discuss the features and limitations of this method and current examples of this technique.

II. New Movies

Show a current movie that uses a great deal of animation (TRON, STAR TREK, SUPERMAN, STAR WARS). Compare with older animation results and also compare the other movies with TRON. Why is the animation, in most cases, better than older moves?

III. Cartoons

View an older cartoon (the same background whizzes by 5 times in a running scene), then view a current Saturday morning cartoon and note differences and similarity. If possible have a cartoonist or animator visit your class and show different methods of animation. How has the computer aided animation?

IV. TV Log

Have students keep a log of TV scenes that appear to use the computer to generate it. Discuss the scenes and encourage students to view scenes that appear to be questionable in origin. Use activity sheet for keeping a log.

TV LOG

Directions: Fill out the information below for each scene that appears to be an example of computer graphics.

Channel No.	Day	Time	Show or (one just before)	Short Description of Scene

3.5.4
Reference No.

ACTIVITY TITLE: Music Entertainment

OBJECTIVE: The student will describe computer trends in entertainment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: Students will listen to computer created music and compare it with conventional music.

MATERIALS REQUIRED: Any of the Following:

Records: "First Philadelphia Computer Music Festival", from Creative Computing, P.O. Box 789-M, Morristown, N.J., 07960, about $6.00.

Film: Discovering Electronic Music, available from Clackamas Media Library. Their description: Discovering Electronic Music. In this age of technology, it is not surprising that music is being strongly influenced by electronics. This film shows us something of the physical basis of music and how it can be created and altered by electronic means. We see the sound synthesizer and learn of its capacity to create, envelope, and filter sounds. We learn about computer controlled music and watch a composition being created through the use of a computer."

Other: Computer programs and computer to play music, musical watches, greeting cards, etc.

Instruments: Have students bring musical instruments.

ADDITIONAL RESOURCES: Other Software:

Electronic Duet,
OECC - Music Public Domain
Disk No. 712,
MECC - Music Theory Volume I, Version 2.1,
Alf - Three Part or Nine Part Harmony.

MUSIC ENTERTAINMENT

The music field has changed dramatically with the advent of computer technology. This activity will provide experience with the music and questions for discussion.

I. Listening

Play the record "First Philadelphia Computer Music Festival" or any other record of computer generated music. Discuss student reactions to the music:

A. Do you feel this is "music"?
B. What do you think the musicians look like? Do you see them with formal dress, fancy "show" costumes, rags?
C. Can you hear each "instrument" in the computer generated music?
D. Does some of the music make you want to dance?
E. What was your favorite song? Why?
F. What was the worst song? Why?

II. Show the film "Discovering Electronic Music" and discuss the ideas presented.

III. Experiencing

A. If you can locate a computer and music program, have students create their own music. If one is not available, try getting a portable keyboard, a musical watch, Simon or other musical device and use them in class. Discuss the variety of sounds.

B. Have the students that brought musical instruments play some of the same melodies played electronically. Compare the sound and quality.

C. Vocal Match - Play an electronic tone or short melody and challenge your students to match the sound with their voices.

D. If available, experiment with music synthesizers.

3.5.5
Reference No.

ACTIVITY TITLE: Creating Graphics

OBJECTIVE: The student will describe computer trends in entertainment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Many of the video computer games and adventures for the Apple Computer use graphics. Some authors of these games use the program, "Graphics Magician" to create these exciting screen adventures. With the following manual and the disk students can easily explore graphics on the Apple Computer.

MATERIALS REQUIRED: Apple Computer

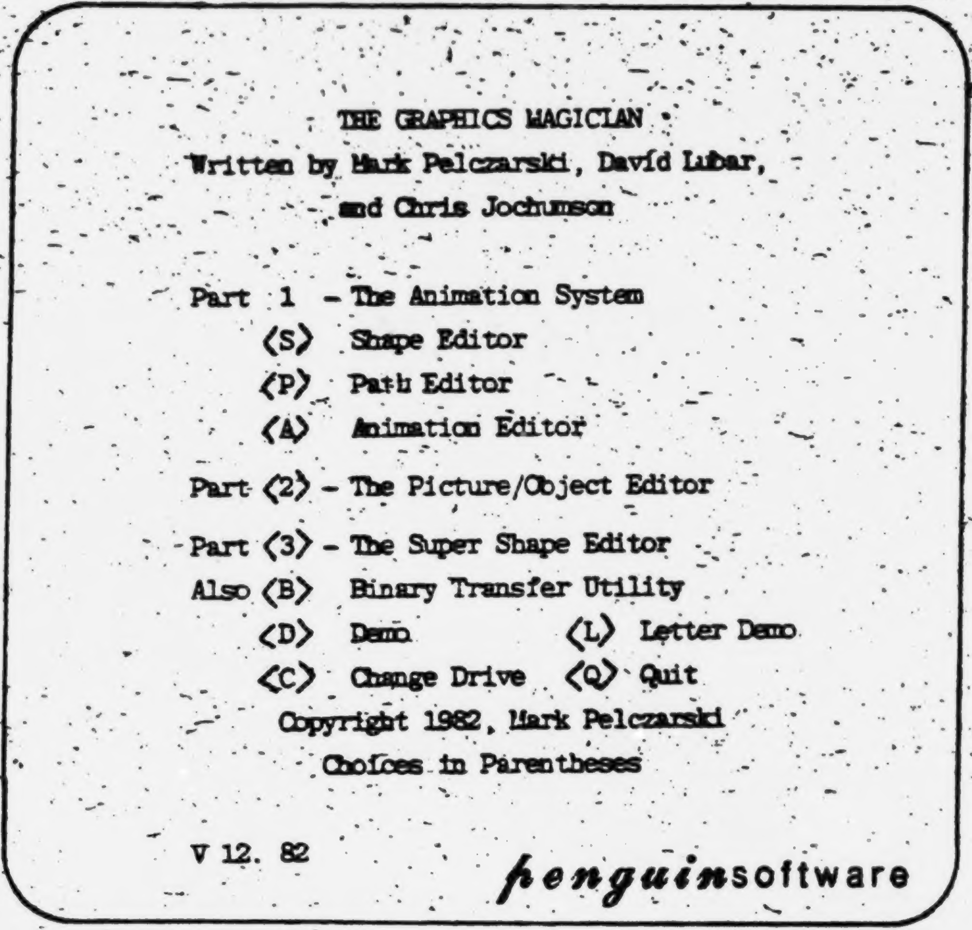
Computer Program:
Graphic Magician (Penguin Software)
Manual

Recommended:

Color TV or monitor
Paddles or joystick (necessary for some of the activities)

ADDITIONAL RESOURCES:

COMPUTER GRAPHICS



THE GRAPHICS MAGICIAN

Written by Mark Pelczarski, David Lubar,
and Chris Jochumson

Part 1 - The Animation System
  <S> Shape Editor
  <P> Path Editor
  <A> Animation Editor

Part <2> - The Picture/Object Editor

Part <3> - The Super Shape Editor
Also <B> Binary Transfer Utility
  <D> Demo <L> Letter Demo
  <C> Change Drive <Q> Quit

Copyright 1982, Mark Pelczarski
Choices in Parentheses

V 12. 82

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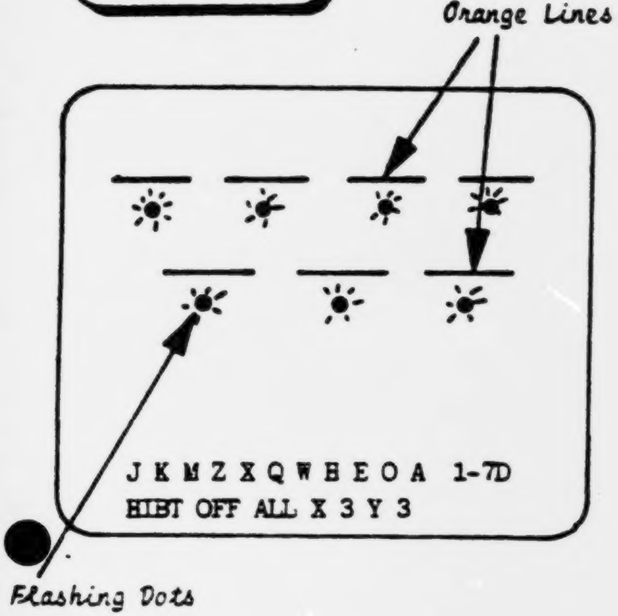
Special Projects
Oregon City School District #62

PART 1

THE ANIMATION SYSTEM

Insert the Graphics Magician disk and turn on both the computer and monitor.

SHAPE EDITOR


Orange Lines
J K M Z X Q W H E O A 1-7D
HIBT OFF ALL X 3 Y 3
Flashing Dots

The screen clears and 7 orange lines

and

this information appears. The letters are abbreviations for commands which control the movement of the flashing dots called cursors

I - Moves dot ↑

J - Moves dot ←

K - Moves dot →

M - Moves dot ↓

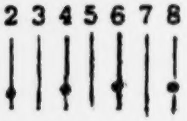
Z - Plots a point

X - Erases a point

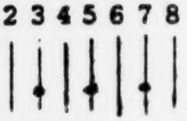
Q - Locks plotting so lines and shapes may be made

W - Locks erasing

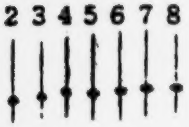
E - Plots even points

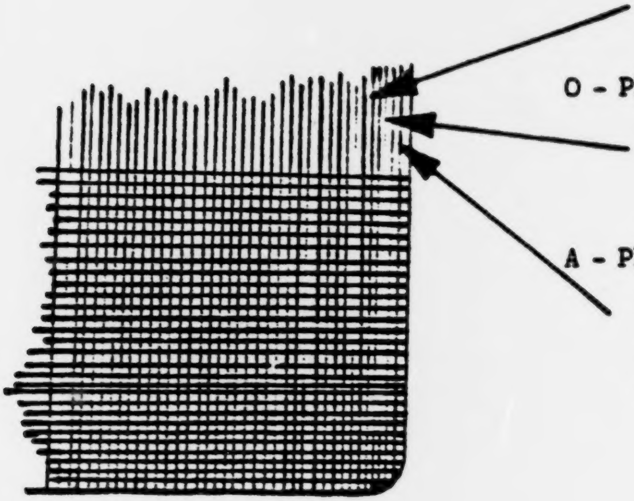


O - Plots odd points



A - Plots all points





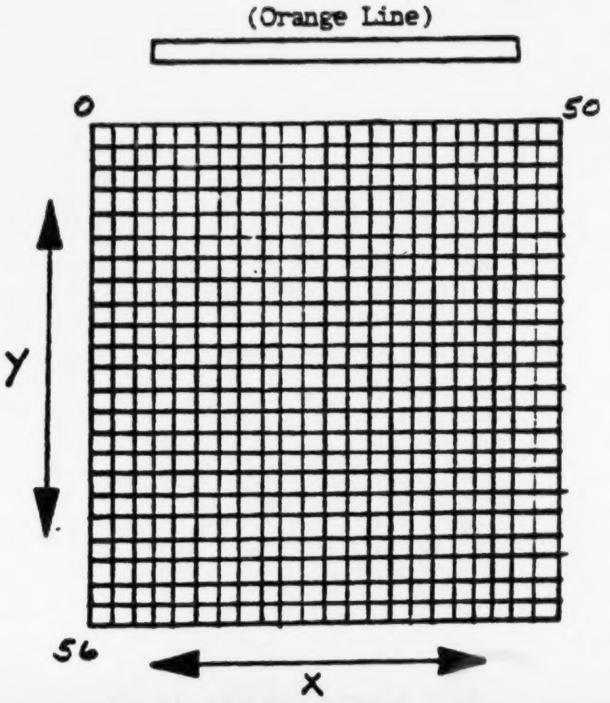
1 - Turns off and on Line 1
2 - Turns off and on Line 2
3 - Turns off and on Line 3
4 - Turns off and on Line 4
5 - Turns off and on Line 5
6 - Turns off and on Line 6
7 - Turns off and on Line 7

D - Indicates that you are done
(the shape is finished)

H - HBIT OFF (on) - controls the color of lines plotted. This also depends on whether you are using:

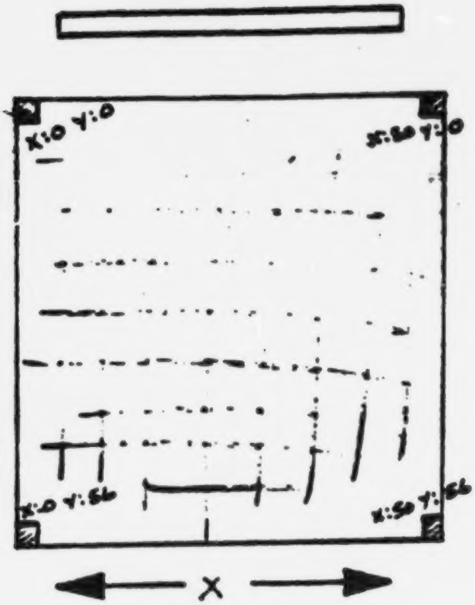
O - Odd points
E - Even points
A - All points
(see chart—)

	HBIT OFF	HBIT ON
E-EVEN	violet	blue
O-ODD	green	orange
A-ALL	white	white



X
Y Show the location of a point.

Orange Line


X:0 Y:0
X:50 Y:0
Y
X:0 Y:56
X:50 Y:56
X

Under the orange line is an invisible grid of 50 x 56 points

The upper left point is X:0 Y:0

The upper right point is X:0 Y:50

The lower left point is X:0 Y:56

The lower right point is X:50 Y:56

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Lets see if you can make a shape. Try a blue block letter "L". Follow these instructions:

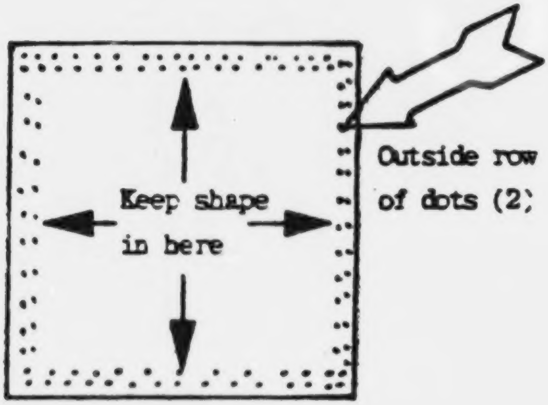
First: Initialize a blank disk with any standard format.

① Put the HBIT to the ON position by typing the letter H on the keyboard.

② To plot in blue, use only even points (type E).

③ For your first trial, turn off orange lines 2 - 7 by typing 2, 3, 4, 5, 6, and 7. Each of these numbers turns off its corresponding line. You are now left with only orange line 1 and its flashing cursor.

④ Remember that the area available in which to plot a shape under the orange line is the size of a box 50 points wide and 56 points high. It is best not to use the two outside rows of points in your shape.



⑤ Now make a letter "L"

To start locate the cursor within the outer 2 rows of dots and place it at a point along which your L will be drawn. Type Q to lock the plotter in place and use the I, J, K, and M to draw a letter M. You may use the REPEAT key to draw your figure more quickly.

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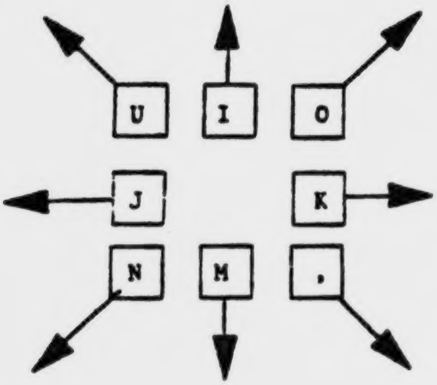
THE PATH EDITOR

This part ot the program < > tells the computer where your animation is to move on the screen. You will Set A

(Starting Point - this is set in the animation editor)
A Path And an
Ending point

Press the < > from the menu. You will then need to decide where you want to start the path.



1. Place the cursor at the starting point and press S to start the path. Use the U, I, O, J, K, N, M, and , keys to trace your path on the screen. The REPEAT key RPT may also be used to move more quickly,

2. If you make a mistake, correct it with the D (delete) key.

3. When you finish the path, press the S key to save it. You are now ready to try out your path with the Helicopter shape from Part I. Type Q to quit. This will take you back to the main menu.

NOTE

If you are working in color (not white) you must remember the even and odd columns (see p.___). To move the shape only in even and odd columns you must move the path over the unwanted columns without plotting the path there. Use these keys to move the shape but not plot it:

RETURN	up
←	left
→	right
/	down

The Z key will lock in your move and may also be used to create a pause in movement along the path.

The F key will switch to full screen graphics. Press it again and it switches back.

C clears the path you first made and you can start over.

NOTE

Each shape has three paths to follow in sequence.

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The Animation Editor

Note: Skip this section and go to the PICTURE/OBJECT EDITOR first. You will create a high resolution background, which can be added to your animation and path already created.

You now have

(1) an animation
(2) a path
(3) a background high resolution picture

In the Animation Editor, you will bring all these together.

HOW TO COMPLETE YOUR ANIMATION:

1. Boot the Graphics Magician disk
2. Select the Animation Editor A
3. Your choices will then be:

⟨1⟩ Block

⟨2⟩ Block with Background

⟨3⟩ Draw, Save Background

⟨4⟩ XDraw

4. Press ⟨3⟩ Draw, Save Background

5. Your new selection consist of:

⟨L⟩ OAD
⟨N⟩ EW OBJECT
⟨E⟩ DIT OBJECT
⟨A⟩ NIMATE
⟨S⟩ AVE
⟨D⟩ ISK CATALOG
⟨H⟩ I-RES CLEAR
⟨C⟩ LEAR
⟨M⟩ ENU

6. You now need to load the three parts of your animation (animation, path and background). Press L OAD and you will be given a choice of

(S) HAPE, (P) ATH, (H) I-RES SCREEN, or
(A) NIMATION TABLES

You will have to load the first thru (3) of these.

NOTE: Be sure to switch disks before loading. The animation, path and picture were saved on YOUR disk

7. Load each of the three parts

⟨S⟩ then ⟨P⟩ then ⟨H⟩

8. You now have to create a new object ⟨N⟩

```
OBJECT #0
SHAPE NUMBER                              TYPE 0

STARTING LOCATION, X:                     TYPE 5
```

STARTING LOCATION, Y:	TYPE 5	
PATH #0:	TYPE 0	You can use up to three paths
PATH #1	TYPE 0	
PATH #2	TYPE 0	

Now Choose

255	REPEAT
254	F/DRAW
253	ERASE

STARTING PATH #	TYPE 0
STARTING LOCATION IN PATH	TYPE 1

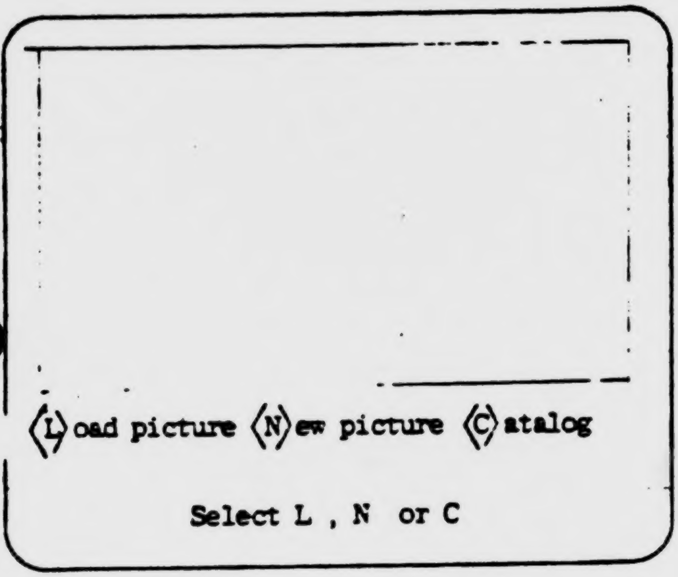
9. You are then returned to the menu. Press ⟨A⟩ NIMATE and the animation will appear on the screen.

10. If you are satisfied with it use ⟨S⟩ AVE and the animation will be saved on your disk.

PART 2

THE PICTURE/OBJECT EDITOR

PICTURE/OBJECT EDITOR



⟨L⟩oad picture ⟨N⟩ew picture ⟨C⟩atalog

Select L , N or C

Return to the menu and press . This selects the picture/object editor. You must use either a joy stick or game paddles to draw.

A picture generally starts with a white screen, lines are added in black to define areas. A fill routine adds color to various enclosed areas. Paintbrushes are then used to add details.

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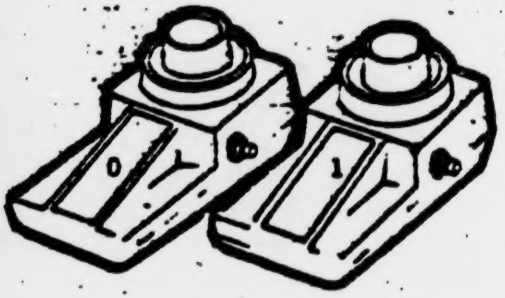
PICTURE/OBJECT EDITOR COMMANDS



$\boxed{\text{L}}$ - Puts you in the LINE DRAWING MODE. On the game paddle (or joystick) the 0 button draws lines and the 1 button starts new points and lines.

$\boxed{\text{F}}$ - This is the fill mode and is used to fill an area with a color.

How to fill an area:

(1) Type $\boxed{\text{F}}$

(2) Select a color from the palette by typing $\boxed{\text{C}}$. This will present you with 107 different colors and textures from which to select.

Decide on which color you will choose and remember its number. Press the $\boxed{\text{C}}$ k again, you will be asked

COLOR:

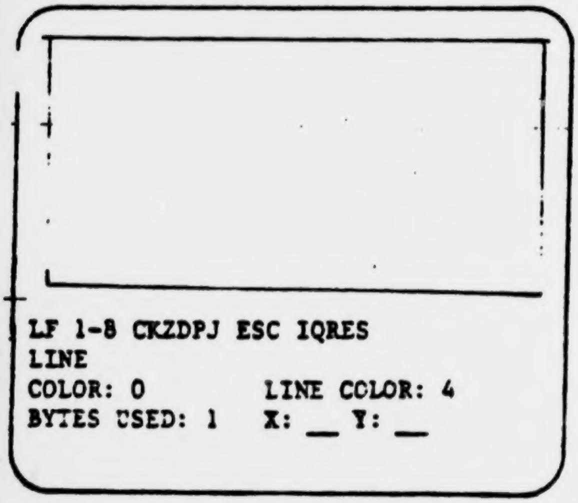
Type in the number you choose

1-8 select brush sizes.

$\boxed{\text{D}}$ selects colors for filing areas.

$\boxed{\text{K}}$ selects a new line color from this list:

0 - black 1
1 - green
2 - violet
3 - white 1
4 - black 2
5 - orange
6 - blue
7 - white 2



```
LF 1-8 CKZDPJ ESC IQRES
LINE
COLOR: 0          LINE COLOR: 4
BYTES USED: 1     X: __ Y: __
```

$\boxed{\text{N}}$ Screen for a new picture

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P - shows you the color palette

J - reverses the directions on the game paddle or joy stick.

ESC - eliminates commands at the bottom of the screen.

Z - zeroes in on small areas immediately around the cursor, allows better control in small spaces.

D - deletes your last move.

R - reconstructs your picture so you can see how it looks.

S - saves the picture as is. Give it a name.

I - saves the picture in standard format.

Note: use this one

E - edit mode which allows you to make changes in any part of the picture.

Q - quite - to start a new picture or return to the menu.

PICTURE/OBJECT EDITOR
PRACTICE
PROBLEM

Draw and color a house

Use the PICTURE/OBJECT Editing commands on page 2 and 3 to do this part of the lesson.

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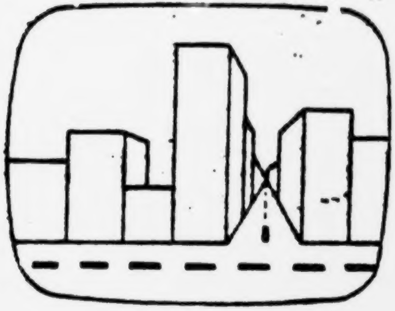
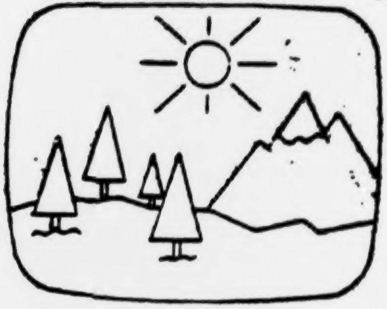
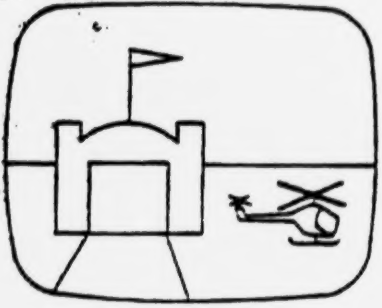
ASSIGNMENT 3 Create a background picture for the helicopter. The following sketches are ideas you may use as examples:







FOLLOW THESE STEPS:

1. Sketch background on a sheet of graph paper.
2. Connect game paddles.
3. Type L to set the line draw mode.
4. Locate the cursor + at a place on the screen where you want to start drawing. Press the button on the #1 paddle.
5. Using paddles #1 and #2 move the cursor along your drawing and press the button on paddle #0 to draw the line. Straight lines are easy!.
6. Continue outlining the shape from your graph paper sketch.
7. Type F to set the fill mode.
8. Type C to select the color to fill the area just drawn.
    a. You will be shown a palette of 107 colors.
    b. Select a color by number.
    c. Press any key to get to a text mode.
    d. Now type in the number of your color.

9. Locate the cursor $\boxed{+}$ in the center of the area to be filled.

10. Press the button on paddle #0. The area should fill with color. If not, move the cursor to a clear area and try again.

11. Type $\boxed{L}$ and make another part of your picture. Follow steps 3 - 10 above. Continue until you have a complete and colored picture.

12. If you are satisfied with the picture, type $\boxed{I}$ to save it.

13. The edit mode $\boxed{E}$ allows you to make changes in the picture such as shapes and colors.

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PRACTICE PAGE

Orange Bar

3.5.6
Reference No.

ACTIVITY TITLE: TRON Retread

OBJECTIVE: The student will describe computer trends in entertainment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: The student will fill out a worksheet after/while viewing the movie TRON.

MATERIALS REQUIRED: TRON student activity worksheet

See section 5.0.3 for activity worksheet

ADDITIONAL RESOURCES:

3.5.7
Reference No.

ACTIVITY TITLE: Graphics Galore

OBJECTIVE: The student will describe computer trends in entertainment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*		

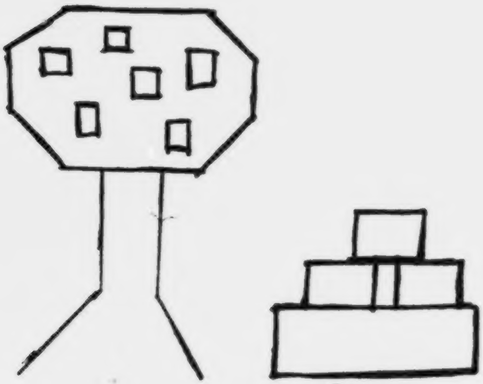
DESCRIPTION: In the following activity, students are introduced to graphics and how computers create pictures. Duplicate the coordinates on the following page. See that students have graph paper and have them plot the points. Then connect the dots to create a picture.

EXTENSION: Have students create their own dot to dot puzzle similiar to the one given, then share it with classmates.

MATERIALS REQUIRED: Graph paper
Pencil

ADDITIONAL RESOURCES: Graphing Fun #2834
Instructo/McGraw Hill
Paoli PA 19301

Answer key: Apple Tree With A Box Of Apples



GRAPHICS GALORE

(7, 0)
(12, 5)
(12,16)
(10,16)
(3,23)
(3,31)
(7,35)
(21,35)
(25,31)
(25,23)
(18,16)
(16,16)
(16, 5)
(21, 0)

STOP

(7,31)
(9,31)
(9,29)
(7,31)

STOP

(11,33)
(13,33)
(13,31)
(11,31)
(11,33)

STOP

(19,30)
(21,30)
(21,28)
(19,28)
(19,30)

STOP

(13,29)
(15,29)
(15,27)
(13,27)
(13,29)

STOP

(9,26)
(11,26)
(11,24)
(9,24)
(9,26)

STOP

(16,24)
(18,24)
(18,22)
(16,22)
(16,24)

STOP

(22, 0)
(22, 3)
(28, 3)
(28, 0)

STOP

(23, 3)
(23, 5)
(25, 5)
(25, 3)

STOP

(26, 3)
(26, 5)
(28, 5)
(28, 3)

STOP

(24, 5)
(24, 7)
(26, 7)
(26, 5)
(24, 5)

STOP

3.5.8
Reference No.

ACTIVITY TITLE: Video Games

OBJECTIVE: The student will describe current computer trends in entertainment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*			

DESCRIPTION: The student will discuss their favorite video games and list characteristics common to them that make them so attractive such as:

1. Sound
2. Movement - Action
3. Color
4. Surprise!

What do students like about the games? What do they dislike about them? What skills do you develop in playing video games?

If possible, play a number of video games and study the characteristics discussed above.

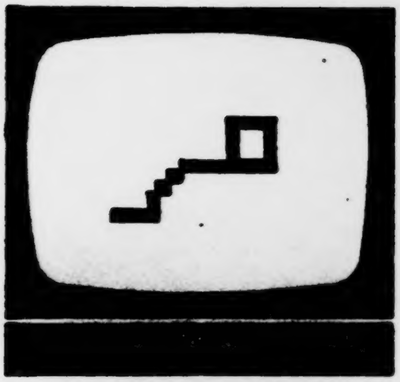
Finally, if an Apple Computer is available, enter the programs from "PROGRAMMER'S CORNER", save it, and have students experiment with it and try to solve the problems listed to the right of the program.

MATERIALS REQUIRED: Computer (Apple Computer for some activities)

ADDITIONAL RESOURCES:

3.5.8

PROGRAMMER'S CORNER



1. How can you change the color?

2. What do the following keys do?

   I. ____________________

   J. ____________________

   K. ____________________

   M. ____________________

3. Make a square.

4. How can you erase parts of a picture?

5. Try making a circle.

6. Draw the first letter of your name on the screen.

7. Draw a picture.

```
]LIST

10  REM   *** PICTURE MAKER
20  REM    *** FOR APPLE II+
30  REM    *** SET UP GR SCREEN
40  HOME : GR :X = 20:Y = 20
50  REM    *** CHOOSE COLOR
60  INPUT "COLOR (0-16)?";C
70  COLOR= C
80  HOME : PLOT X,Y
100  REM   *** DIRECTIONS
110  VTAB 21: PRINT "COLOR= ";C
120  VTAB 22: PRINT "PRESS I,J,K,
     M KEYS TO MOVE"
130  VTAB 23: PRINT "PRESS 'C' TO
      CHANGE COLOR"
140  REM   *** GETTING SINGLE KEY
      STROKE
150  GET A$
160  REM   *** DETERMINING MOVE
170  IF A$ = "I" THEN Y = Y - 1
180  IF A$ = "J" THEN X = X - 1
190  IF A$ = "K" THEN X = X + 1
200  IF A$ = "M" THEN Y = Y + 1
210  IF A$ = "C" THEN 60
220  REM   *** CHECK FOR OFF SCRE
     EN
230  IF Y = 40 THEN Y = 39
240  IF Y =  - 1 THEN Y = 0
250  IF X = 40 THEN X = 39
260  IF X =  - 1 THEN X = 0
270  REM   *** PLOTTING A POINT
280  PLOT X,Y
290  GOTO 150
```

3.5.9
Reference No.

ACTIVITY TITLE: Text Graphics

OBJECTIVE: The student will describe current computer trends in entertainment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: The student will use a typewriter or computer to create text graphics. Two samples are included.

MATERIALS REQUIRED: Typewriter
Computer
See section 3.5.1

ADDITIONAL RESOURCES: Copy Masters by Winnifred Nichols
J. Weston Walch Publishing
Portland Maine 04104

Fifty (50) Typing Projects.
(see your typing teacher)

TYPEWRITER GRAPHICS

YUM YUM

1. 33 spaces 7 periods
2. 32 spaces 7 periods
3. 2sp 2per 27sp per
4. sp . / sp . 22sp CHERRY
5. 2sp . 2sp . 20sp CHERRY
6. 3sp . 1sp . 19sp CHERRY
7. 4sp . 2p . 20sp HERR
8. 5sp . 1sp . 14sp LAVANILLV
9. 6sp . 2sp . 12sp L 10sp AN
10. 7sp . 1sp . 10sp I 13sp IL
11. 8sp . 2p . 8sp N 15sp L
12. 9sp . 1sp . 6sp A 17sp A
13. 10sp . sp 1 . 4sp V 19sp V
14. 11sp . 2sp . 4sp CHOCOLATE 11/
15. 12sp . 1sp . CHOCOLATECHO 12/
16. 13sp . sp OCOLATE CHOCOLATE 10/
17. 14sp . COLATECHOCOLATE 10/
18. 13sp . CHOCOLATE CHOCOLATE 10/
19. 13sp CHOCOLATE CHOCOLATEC 10/
20. 12sp 30.
21. 12sp . 28sp .
22. 12sp . 28sp .
23. 13sp . 26sp .
24. 14sp . 24sp .
25. 15sp . 22sp .
26. 16sp . 20sp .
27. 17sp . 18sp .
28. 18sp . 16sp .
29. 19sp 16.
30. 26sp 2.
31. 26sp 2.
32. 26sp 2.
33. 26sp 2.
34. 26sp 2.
35. 26sp 2.
36. 26sp 2.
37. 26sp 2.
38. 26sp 2.
39. 26sp 2.
40. 26sp 2.
41. 26sp 2.
42. 25sp . 2sp .
43. 18sp 7. 4sp 7.
44. 17sp 20.

```
                                .......
                               .......
 ..                           .
./ .                      CHERRY
 .  .                    CHERRY
  . .                   CHERRY
   .  .                    HERR
    . .              LAVINILLV
     .  .            L          AN
      . .          I             IL
       .  .        N               L
        . .      A                 A
         . .    V                   V
          .  .    CHOCOLATE           /
           . .CHOCOLATECHO            /
            . OCOLATE CHOCOLATE          /
             .COLATECHOCOLATE           /
            .CHOCOLATE CHOCOLATE          /
            CHOCOLATE CHOCOLATEC          /
           ..............................
           .                            .
           .                            .
            .                          .
             .                        .
              .                      .
               .                    .
                .                  .
                 .                .
                  ................
                         ..
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                         ..
                         ..
                         ..
                         ..
                         ..
                         ..
                         ..
                         ..
                         ..
                        .  .
                 ......     ......
                ....................
```

1. 8sp 3x 6sp 6x
2. 7sp x 3sp 2x 3sp x 4sp x sp x
3. 6sp x 7sp x sp x 6sp x sp x
4. 7sp x 6sp x sp x 6sp x sp x
5. 8sp x sp 4x sp x 2sp x sp 4x sp x
6. 6sp 2x sp x 4sp x sp 2x 4sp x 3sp 2x
7. 4sp 2x sp x 6dash x 8dash x 4sp 2x
8. 3sp x 4sp x 3sp x 2sp 3x 6sp x 6sp x
9. 2sp x 6sp 6x 2sp 6x 8sp x
10. 2sp x 5sp x 6sp 2x 6sp 2x 6sp x
11. 2sp x 4sp x 6sp 3x 7sp x 6sp x
12. 2sp x 5sp x 4sp x 3sp x 5sp x
13. 3sp x 5sp x 18sp x 7sp x
14. 4sp 2x 22sp 3x
15. 6sp 2x 18sp 2x 3sp x
16. 6sp x 17sp 2x 6sp 2x
17. 6sp x 23sp x 2sp x
18. 6sp x 23sp x sp x sp x
19. 5sp x 24sp 2x sp x sp x
20. 5sp x 28sp x sp x
21. 5sp x 28sp x sp x
22. 5sp x 19sp 4x 4sp x sp x sp x
23. 5sp x 18sp x 12sp x
24. 5sp x 16sp 2x 11sp x sp x
25. 6sp x 4sp x 5sp x 3sp x 12sp x sp x sp x
26. 6sp x 4sp x 5sp x 2sp x 13sp x sp x sp x
27. 6sp x 4sp x 5sp x 2sp x 17sp x
28. 6sp x 4sp x 5sp x 2sp x 17sp 3x
29. 6sp x 3sp xx 5sp x 2sp x 3sp 5x 8sp x 3sp
30. 4sp 2x 3sp x 7sp x 3sp 3x 5sp 6x 7sp x
31. 4sp x sp x 2sp x sp x 3sp x sp 2x sp x 14sp x 6sp x
32. 4sp 2x 3sp 2x sp x 4sp 2x 3sp x 19sp x
33. 5sp 4x sp 7x 2sp 4x 16sp 3x
34. 23sp 16x
35. Same
36. Same
37. sp 4x 2sp 3x 2sp 4x 2sp 4x sp 2x sp 4x sp x 4sp 4x
38. x 5sp x 3sp x sp x 3sp x sp x 4sp xx sp x 4sp x 5sp 3sp x
39. x 2sp 2x sp x 3sp x sp 2x sp x 2sp 3x 2sp 2x sp 3x 2sp x 5sp x 4sp x
40. x 3sp x sp 5x sp x sp x 3sp x 4sp 2x sp x 4sp x 5sp x 3sp x
41. sp 4x sp x 3sp x sp x 2sp x 2sp x 4sp 2x sp 4x sp 4x sp 4x

```
          xxx     xxxxxx
         x   xx   x   x x
        x       x x     x x
         x      x x     x x
          x xxxx x  x xxxx x
       xx x    x xx    x   xx
     xx x------x--------x     xx
     x    x   x  xxx      x      x
    x     xxxxxx  xxxxxx         x
    x     x     xx      xx       x
    x   x      xxx       x       x
    x     x    x   x    x        x
     x    x                  x
     xx                      xxx
       xx                  xx   x
       x                 xx      xx
       x                       x  x
       x                       x x x
      x                        xx x x
      x                            x x
      x                            x x
      x                   xxxx    x x x
      x                  x            x
      x                xx           x x
       x    x     x   x            x x x
       x    x     x  x             x x x
       x    x     x x                 x
       x    x     x  x                xxx
       x   xx     x  x   xxxxx        x
    xx    x       x   xxx     xxxxxx       x
    x x  x x   x xx x              x      x
    xx   xx x    xx    x                   x
     xxxx xxxxxxx  xxxx                xxx
                       xxxxxxxxxxxxxxxx
                       xxxxxxxxxxxxxxxx
                       xxxxxxxxxxxxxxxx
 xxxx  xxx  xxxx  xxxx xx xxxx x     xxxx
x     x   x x   x x    xx x    x     x   x
x  xx x   x xx x  xxx  xx xxx  x     x    x
x   x xxxxx x x   x    xx x    x     x   x
 xxxx x   x x  x  x    xx xxxx xxxx  xxxx
```

3.5.10
Reference No.

ACTIVITY TITLE: Graphics And Newspapers

OBJECTIVE: The student will describe current computer trends in entertainment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*		

DESCRIPTION: Many of the "pictures" that we see every day are actually made up of a series of dots. Pictures in newspapers, if inspected with a magnifying glass, are a series of neatly ordered dots. TV screens are also dot oriented. Pictures relayed through space are made up of dots. Also, the smaller the dot the better ther resolution, or the clearer the picture appears. Computer graphics, in most cases, also makes use of dots to create images. The activities below explore these ideas.

EXTENSION: Collect a few samples of newspaper clippings and have the students look at them with a magnifying glass. Discuss observations of the pictures from five to 10 feet. How do the dots differ?

MATERIALS REQUIRED: Newspaper pictures

ADDITIONAL RESOURCES:

3.6.1
Reference No.

ACTIVITY TITLE: Haiku

OBJECTIVE: The student will discuss the potential effects of computer use in the home, school, and work environment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: This activity shows how a computer can generate haiku poetry. Suggestions are given to allow the student to generate a unique haiku. Use this activity to generate discussion beginning with "If a computer can compose poems, then a computer may be able to ______________________."

EXTENSION: This activity could easily be adapted to a word processor.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: Are You Computer Literate?

Software (Public Domain) - Haiku

HAIKU

Haiku is a form of Japanese poetry. Two examples follow:

All pure in the leaves
I seize pale buds in the hills
Swish the leaf has blown

All black in the fog
I flash red tress in the mist
Look the moon has shrunk

These poems were composed by a computer. Notice that haiku is written with 17 syllables in 3 lines (5 in the first line, then 7, and then 5). The Japanese poems are always about nature and give clues to the season or time of day.

Study the two poems above. What words are the same in each of them? Notice that the poems follow the patterns given below. A$ to I$ represent words to be illed in.

All A$ in the B$
I C$ D$ E$ in the F$
G$ the H$ has I$

A computer can write haiku by selecting words from a table provided by the computer programmer. An example of a table of suitable words is given below.

A$	B$	C$	D$	E$	F$	G$	H$	I$
pure	leaves	see	round	grass	hills	Shoo	flower	dimmed
black	heat	seize	pale	trees	mist	Swish	moon	shrunk
red	fog	smell	red	buds	dusk	Look	leaf	sprung
blue	cold	flash	green	hills	heat	Crash	bird	blown

The first "computer generated" haiku at the top of the page comes from the number sequence 1, 1, 2, 2, 3, 1, 2, 3, 4. That is, the computer selects the first word from the A$ column, the first word from the B$ column, the second word from the third column, and so on.

- * What number sequence was used to generate the second poem?
- * What poem is generated by the number sequence 4, 3, 2, 1, 2, 3, 4, 3, 2?
- * Add two more words to each column of the word table. Since each column now contains six words, a die can be tossed to select a random word. Use throws of a die to generate a haiku. Does your poem make sense?

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From: Are You Computer Literate?, pages 81 and 82.

3.6.2
Reference No.

ACTIVITY TITLE: Computers Affect Us

OBJECTIVE: The student will discuss the potential effects of computer use in the home, school, and work environment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: Many grocery stores now have electronic scales connected to their cash registers. Talk to a grocery store clerk to learn how these machines work. Write a brief report on what you learn, including the clerk's attitude towards this computer technology. Does the existence and widespread use of electronic digital scales have a potential impact upon the content of the elementary or middle school curriculum? After discussing the above questions, write a paragraph using the topic sentence: Electronic digital scales will affect what is taught in school.

EXTENSION: This report could be done on a word processor.

EXTENSION: The same discussion for other uses of a digital display, for example, stop watches, thermometers, etc.

MATERIALS REQUIRED: Pen
Pencil
Paper

ADDITIONAL RESOURCES: The Computing Teacher, Vol. 8, No. 4, page 12.

3.7.1
Reference No.

ACTIVITY TITLE: Criteria

OBJECTIVE: The student will list the criteria for determining the need for computer equipment in given applications.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Brainstorm ideas "Why I Need A Computer?" and "Why I Don't Need A Computer?".

QUESTIONS FOR DEVELOPING CRITERIA

1. Decide on main use for computer.
2. Look at software that is available for specific uses.
3. Is memory adequate for main use?
4. Determine main requirements and kind of keyboard.
5. Determine any second uses for machines and any other features that would be desired.
6. Decide how much you are going to spend. Consider service and warranty.
7. Can system be upgraded and expanded?

MATERIALS REQUIRED: See also section 5.3.4

Word find for computer company

ADDITIONAL RESOURCES:

3.8.1
Reference No.

ACTIVITY TITLE: Journal

OBJECTIVE: The student will list examples of computer applications which are invisible to the general public.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION:

Microprocessor: A one chip central processing unit.

Multiple use Microprocessor: A microprocessor which may be programmed for a variety of uses. An Apple, PET, TRS-80, etc. are examples of this use.

Dedicated Microprocessor: A microprocessor which is programmed for one and only one use. Examples are Speak and Spell, microwave ovens, clocks, cameras, etc.

Discuss with students the differences between a dedicated microprocessor and a multiple use microprocessor. Then have students keep a journal for a day recording activities which they think involve one of the types of microprocessors. Some general areas of activities to consider might include entertainment, environment control (air conditioning, heating, etc.), menu planning, budget planning, traffic control, communications, etc. When this is done, discuss results with students. It may be helpful to list all of the activities so all students can see them.

EXTENSION: Discuss places where microprocessors are not presently used but could be easily adapted.

MATERIALS REQUIRED: Paper
Pencil

ADDITIONAL RESOURCES:

3.9.1
Reference No.

ACTIVITY TITLE: Computer Error

OBJECTIVE: The student will develop a questioning attitude toward error in computer output.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	*

DESCRIPTION: Discuss possible mistakes computers can make. Read the paragraph below, then have students write a conclusion. Small children could draw pictures illustrating the story. Discussing possible outcomes might give reluctant writers some ideas to get them started, or they could write their own ideas of computer errors.

MISTAKE?

READ THE BEGINNING OF THE FOLLOWING STORY AND THEN FINISH IT.

Alert! Alert! flashed the screen of the missile tracking computer system. The giant sentry announced the dreaded warning in cold green letters. Yet every person moved into swift action. Was this for real or was it just another case of error? Computer error had caused the missile crews in their drab grey bombers to begin their perilous journey twice that month. Failure in a small circuit, costing less than a dollar, had been the culprit before. Was this for real? Would the recall come in time? Would it come at all?

(Have students imagine what happens.)

For elementary students, discuss a few possible outcomes or endings for this story. Have each student draw a picture of the ending she/he thinks is most likely to occur.

EXTENSION: Use a word processor to complete the activity.

MATERIALS REQUIRED: Copy of story beginning

ADDITIONAL RESOURCES: READ, Magazine, Vol. 31, No. 16, April 21, 1982.

3.9.2
Reference No.

ACTIVITY TITLE: Is This Reasonable?

OBJECTIVE: The student will develop a questioning attitude toward errors in computer output.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: Administer test using scantron or other machine format and then deliberately mark the key incorrectly or even have two keys used, both of them being incorrect. This should generate discussions about "errors" computers make.

MATERIALS REQUIRED: Scantron cards and machine to correct them
Copies of attached test
Pencil

ADDITIONAL RESOURCES:

Answer key:

1. c
2. c
3. a
4. d
5. a, b
6. d
7. a, c, d, e
8. e
9. d
10. b, c, d
11. b, c, d
12. a, b, c, d, e
13. a, b, c, d, e
14. c
15. c, d
16. b
17. e
18. e
19. a
20. b, e

COMPUTER LITERACY TEST

Directions: There may be more than one correct answer for a question. Choose all correct answers and mark them on the scantron.

1. Arrange the following computing items in chronological order. Which item would come third?

    a) abacus
    b) Eniac
    c) Herman Hollerith's Census Machine
    d) microcomputers
    e) fingers/pebbles

2. Which item does not belong in the following groups?

    a) input
    b) control
    c) tape recorder
    d) output
    e) memory

3. Which item does not belong in the following group?

    a) ENIAC
    b) PASCAL
    c) BASIC
    d) FORTRAN
    e) COBOL

4. Which career was not created directly by the computer industry?

    a) programmer
    b) data processor
    c) system analyst
    d) secretary
    e) computer technician

5. Mark all correct answers. A computer programmer needs to be able to:

    a) think logically
    b) like detailed work
    c) type quickly
    d) operate all different types of equipment
    e) fix the computer

6. Computers are not used in the home for:

    a) protection
    b) communications
    c) entertainment
    d) doing dishes
    e) record keeping

7. Computers are currently used in schools for:

    a) CIS
    b) replacing teachers in the classroom
    c) word processing
    d) drill and practice
    e) instruction

8. Computers are not used in business for:

    a) decision-making
    b) processing data
    c) robotics
    d) word processing
    e) sharpening pencils

9. Governments do not use computers for:

    a) tax collection
    b) census taking
    c) law enforcement
    d) interviewing job applicants
    e) public opinion polls

10. Computers do not:

    a) talk
    b) express their emotions
    c) read and summarize a paragraph
    d) think
    e) solve a complicated math problem

11. The key advantages of computers are:

    a) keyboards
    b) speed
    c) accuracy
    d) mass storage capabilities
    e) monitors

12. Mark all of the input devices - ways to get information into the computer.

    a) light pen
    b) disk
    c) keyboard
    d) cords
    e) tape recorder

13. A disk may be damaged if one:

    a) writes on the jacket containing it
    b) puts it in disk drive before starting the unit
    c) places it near heat
    d) exposes it to a magnetic field
    e) touches it, other than on the label edge

14. A good definition of a computer is:

    a) a superspeed calculator
    b) a machine that used binary numbers to do math problems
    c) an electronic automated device that can solve problems involving words and numbers
    d) any machine that can add, subtract, multiply and divide numbers
    e) a game machine

15. Most errors blamed on computers used in business are actually due to:

    a) hardware problems
    b) programming errors
    c) data preparation
    d) data entry errors
    e) none of the above

16. With respect to computers and automation, is it correct to say:

    a) computers are primarily responsible for our current levels of unemployment
    b) computers have helped wipe out many jobs but have helped create other jobs
    c) that each computer displaces 10-15 workers
    d) computers are creating about two million jobs a year
    e) computers will be able to do all possible jobs

17. Large scale or national data banks are not a threat to privacy because:

    a) the truth cannot hurt people
    b) they are prohibited by law
    c) they are used only for our benefit
    d) computers couldn't ever accomplish the task
    e) none of the above is correct

18. Computer literacy is:

    a) being able to write programs
    b) being able to operate the computer
    c) knowing the history of computing
    d) knowing the structure and function of computer systems
    e) all of the above combined

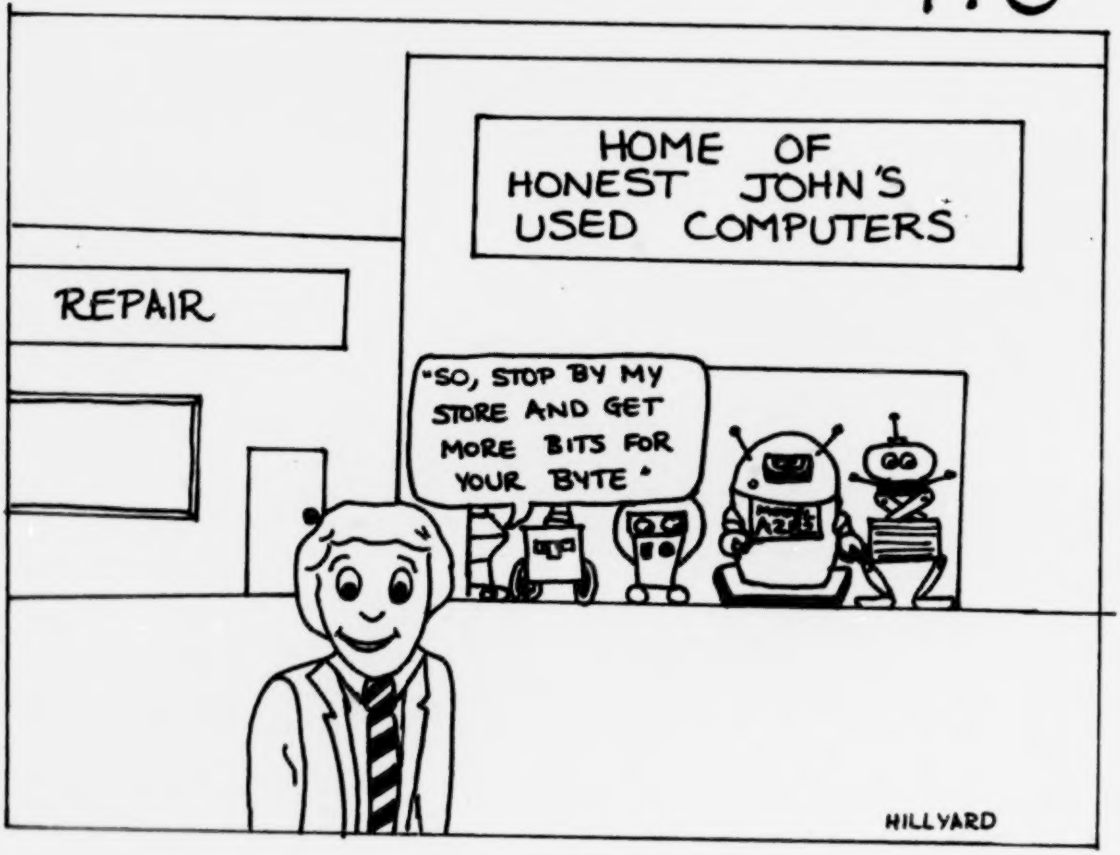
19. Flowcharting is:

    a) a tool for visualizing the processes involved in solving a problem
    b) a program for the computer
    c) a chart for keeping track of data
    d) a set of symbols, such as ovals, squares, etc.
    e) a chart describing the input and storing of computer programs

20. Computer crime:

    a) is not possible
    b) is a real problem we need to be concerned with
    c) does not apply to copying programs
    d) is committed by professional embezzlers only
    e) is as common as tying your shoe

4.0


HOME OF
HONEST JOHN'S
USED COMPUTERS
REPAIR
"SO, STOP BY MY STORE AND GET MORE BITS FOR YOUR BYTE"
HILLYARD

SCOPE AND SEQUENCE

The X indicates instruction for that level should occur.

4. The student will learn about current limitations and future uses of computers.

	K-3	4-6	7-8	9-12
The student will:				
4.1 Recognize characteristics that distinquish machine artifical intelligence from human intelligence.			X	X
4.2 Recognize limitations of the communication capacities of computers.	X	X	X	X
4.3 Be aware that computers do not possess human emotions.	X	X	X	X
4.4 Identify common task which are not suited to computer solution.	X	X	X	X
4.5 Discuss social and technological factors that contribute to or inhibit future development of computer applications.			X	X
4.6 Discuss future computer applications.	X	X	X	X

4.1.1
Reference No.

ACTIVITY TITLE: How Do Robots Think

OBJECTIVE: The student will recognize characteristics that distinguish machine artifical intelligence from human intelligence.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: A robot is a machine which completes a task by following very specific directions. Discuss where robots might be used: entertainment, movies, assembly lines, handling dangerous chemicals, etc. "How Do Robots Think" idea sheet on the next page. Then have students use some of the activities.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES: Classroom Computer News, September/October 1981, pages 27-30.

HOW DO ROBOTS THINK

A robot is a machine with a computer to tell it what to do. A robot contains motors, gears, arms, mechanical grippers, and wires.

Robots are used in car factories to weld, build and paint cars. They are used to do work that is dangerous and boring to human beings.

The robot receives its instructions from a program.

Follow this program to write a number. On a piece of paper first put your pen/pencil at the center of the paper then -

Move left 3 inches
Move down 6 inches
Move right 3 inch
Move up 3 inches
Move left 3 inches

1. Write a robot program for a classmate to follow that will draw letters and numbers.

2. Write a robot program to pick up a pencil and put it in a box.

3. Write a robot program to get up, walk across the room and go out the door.

4. Have small groups of students write a program for a robot to do something in the classroom. You play robot -- have students be specific in giving directions. For example, turn left is not sufficient -- how far left is important. Program/robot could stop when directions are not sufficient.

4.1.2
Reference No.

ACTIVITY TITLE: What Can Computers Do

OBJECTIVE: The student will recognize characteristics that distinguish machine artificial intelligence from human intelligence.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Students will read statements that relate to computer intelligence and decide whether they are true or false. The answers can be discussed as a group.

MATERIALS REQUIRED: Attached worksheet

ADDITIONAL RESOURCES: Run the programs Eliza and Animal with the class and discuss whether these programs can be considered "intelligent".
Get and use any strategy game.

Suggested answers to activity:
1. No
2. Yes
3. Yes
4. Yes
5. Yes
6. No
7. No
8. Yes
9. Yes
10. No

WHAT CAN COMPUTERS DO?

Yes or
No

_________ 1. A computer can read a paragraph and give a summary of the paragraph.

_________ 2. A computer can solve a complicated math problem.

_________ 3. A computer can beat a human opponent at chess.

_________ 4. Computers are used to assist jet airplanes in take-off and landing.

_________ 5. Computers can scan sentences in a book and produce spoken output of the words.

_________ 6. Computers can combine ideas to create a new idea.

_________ 7. Computers can translate not only words from our language to another, but translate ideas.

_________ 8. Computers can do medical diagnostic work when presented with symptoms by a doctor.

_________ 9. Computers can help teach a student how to do basic math operations of multiplication and division.

_________ 10. Computers can think.

4.1.3
Reference No.

ACTIVITY TITLE: Discussion Of Human And Computer Intelligence

OBJECTIVE: The student will recognize characteristics that distinguish machine artificial intelligence from human intelligence.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: The class members can suggest characteristics of human intelligence and these can be listed on the board. The students can generate another list of the characteristics of computers. These lists can be compared as to what humans possess in intelligence that computers do not (for example: ability to generalize, create new ideas from old ones) and comparing advantages of computer over humans (processing speed).

MATERIALS REQUIRED:

ADDITIONAL RESOURCES: Mind Machines, videotape from Clackamas County ESD.

4.1.4
Reference No.

ACTIVITY TITLE: Machines Are Smart?

OBJECTIVE: The student will recognize characteristics that distinguish machine intelligence from human intelligence.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: A True-False Quiz which can be used as a pre-test, post-test, or discussion generator on the topic of machine intelligence.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: Are You Computer Literate?

Possible answer key:

1. T
2. T
3. F
4. F
5. T
6. F
7. T
8. F
9. F
10. F

MACHINES ARE SMART?

Many process control machines and robot-like machines contain a built-in computer. See what you know about process control and robots by answering the following true/false questions.

T F 1. An automatic elevator could be classified as a "smart" machine.

T F 2. A thermostat is an example of a process control device.

T F 3. Nowadays every process control machine contains a built-in microprocessor.

T F 4. If a machine is to be classified as "smart", it must be at least as smart as an average first grader.

T F 5. X-ray equipment and a computer are used to control saws in some modern sawmills.

T F 6. In the typical home, there are only one or two process control devices that might be replaced by microprocessors.

T F 7. Assembly line robots can do welding, screw nuts onto bolts, and push connectors together.

T F 8. Most robots are at least as smart as the average person.

T F 9. Once a robot has been told what to do it will overcome almost any obstacle to accomplish its task.

T F 10. Most factory robots understand and can speak a small number of English words.

4.2.1
Reference No.

ACTIVITY TITLE: Computers Limited

OBJECTIVE: The student will recognize limitations of the communication capacities of computers.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*		

DESCRIPTION: Begin by giving the computer an oral command such as "jump up". Then wait for a response. After a wait of several seconds, issue another command and wait. Continue this until students let you know that the computer doesn't understand what you are saying. At this point, a brief discussion about this limitation to the computers ability to communicate.

Next, sit down at keyboard and give the computer another command of some sort which will generate a "SYNTAX ERROR" message. An example might be to again ask the computer to "jump" or "think". Make sure that you don't use any BASIC command. Continue this process until students again break in and let you know that the computer doesn't understand what you are asking. This should lead to a discussion of the computer's language limitations. The computer only understands those commands which are written into its memory.

MATERIALS REQUIRED: Computer

ADDITIONAL RESOURCES: See activity sheet for a suggested list of commands which will generate an error message and a list of commands which will cause the computer to respond correctly.

4.2.1

COMPUTERS LIMITED

Commands which generate an error message	Correspondence commands which the computer can understand
(PRESS RETURN AFTER EACH COMMAND!)	(PRESS RETURN AFTER EACH COMMAND!)
1. Jump Up	1. Print "Jump Up"
2. Quit	2. Stop
3. Add 2 and 5	3. 2 + 5
4. Multiply 3 and 6	4. 3 * 6
5. 2 * 12	5. 2 * 12
6. Divide 20 by 4	6. 20/4
7. Count to Ten	7. For K=1 to 10: Print K: Next
8. Think	8. Print "OK.... I'm Thinking"
9. Print Something	9. Print "Something"

4.2.2
Reference No.

ACTIVITY TITLE: Blind Construction

OBJECTIVE: The student will recognize limitations of the communication capacities of the computers.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	*

DESCRIPTION: Working with the computer offers a new dimension to communication. The programmer "talks" to the computer in its language (BASIC, PASCAL, etc.) and the computer follows these directions with few questions or doubts about the programmer's logic or sanity. If the computer doesn't give the desired result then the directions must be changed. Unfortunately, the computer doesn't respond with, "Are you sure that's what you want me to do?" when it is given directions. So, in many respects, communication between the programmer and the computer is one way.

This one way communication is a cause for frustration for many beginning programmers. They wonder why the computer refuses to follow directions and seriously suspect the crummy little machine of human-like traits (not listening, insolent, bad attitude).

The following activity will allow students to observe this one way communication and its effects.

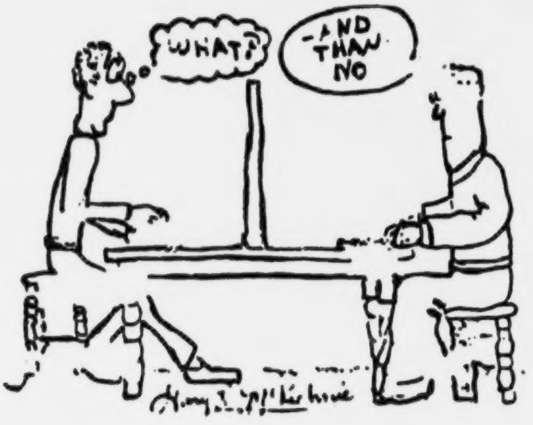
MATERIALS REQUIRED: Divider (cardboard or tall box)
Table or flat desk
Tinker toys, legos, or some other "put together" toy
Two small boxes to hold the toy pieces

ADDITIONAL RESOURCES:

4.2.2

BLIND CONSTRUCTION

Preparation: In each box put identical pieces of the toy. (Using Tinker Toys, each box might contain 4 wheels, 4 green, blue, red, yellow, and orange sticks, and 20 connectors.) Provide enough pieces for a variety of designs. Put the table or desk in the front of the room and place the divider in the middle so that a person at one end can't observe the work of the other person. Place a box of pieces at each end. Be sure the observers of this experiment can see both halves of the table. See below.



Directions: Have a student at each end of the table with one designated as the "talker" (T) and the other as the "listener" (L). T's goal is to build a design and have L duplicate it by giving oral directions to L. L cannot ask questions or give T any information and can only "follow directions". After T has completed his communication, the two designs can be compared. Questions should abound for discussion. Was L confused? How can T be sure his/her directions were clear? Does a computer have an easy job trying to follow our directions? After discussing these ideas, have other students attempt this activity.

From: What to do Until the Computer Comes by Allan Dunn.

4.2.3
Reference No.

ACTIVITY TITLE: How To Do It

OBJECTIVE: The student will recognize limitations of the communication capacities of the computers.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	

DESCRIPTION: Working with the computer offers a new dimension to communication. The programmer "talks" to the computer in its language (BASIC, PASCAL, etc.) and the computer follows these directions with few questions of doubts about the programmer's logic or sanity. If the computer doesn't give the desired result then the directions must be changed. Unfortunately, the computer doesn't respond with, "Are you sure that's what you want me to do?" when it is given directions. So, in many respects, communication between the programmer and the computer is one way.

This one way communication is a cause for frustration for many beginning programmers. They wonder why the computer refuses to follow directions and seriously suspect the crummy little machine of human-like traits (not listening, insolent, bad attitude!) The following activity gives students experience with giving directions, observing the results and modifying the instructions based on this feedback.

Directions: Give students a problem such as this: "I have a coat, but don't know how to put it on. Write directions for me so I can put it on and zip it up". Have each student write directions for the problem. Then have them compare their directions in groups of 3 or 4. Finally, call on one group to give directions while the instructor attempts to carry them out. If there are any snags, have others help. As is true with programming, these directions have to be precise. The instructor can adjust the level of difficulty by refusing to recognize certain words (left, right?). It may be time to call in a pre-school teacher to show how young children are taught to put on their coats! Here are some sample problems:

1. How do I sharpen a pencil?
2. How do I put on my belt?
3. How do I put on rubber gloves?
4. How do I put on a shirt and button it?
5. How do I turn a rubber glove inside out?
6. How do I add 372 and 469?
7. How do I tie a square knot?
8. How do I make a paper airplane?

MATERIALS REQUIRED: Shirt, coat, belt, rubber gloves, pencil, etc.

ADDITIONAL RESOURCES: What to do Until the Computer Comes by Allan Dunn.

4.2.4
Reference No.

ACTIVITY TITLE: Drawing Patterns

OBJECTIVE: The student will recognize limitations of the communication capacities of the computers.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	*

DESCRIPTION: Working with the computer offers a new dimension to communication. The programmer "talks" to the computer in its' language (BASIC, PASCAL, etc.) and the computer follows these directions with few questions or doubts about the programmer's logic or sanity. If the computer doesn't give the desired result, then the directions must be changed. Unfortunately, the computer doesn't respond with, "Are you sure that's what you want me to do?" when it is given directions. So, in many respects, communication between the programmer and the computer is one way.

This one, way communication is a cause for frustration for many beginning programmers. They wonder why the computer refuses to follow directions and seriously suspect the crummy little machine of human-like traits (not listening insolent, bad attitude!).

The following activity demonstrates some of the frustrations experienced by the computer in trying to follow directions.

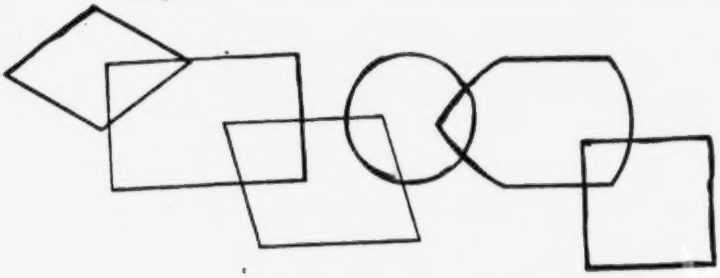
MATERIALS REQUIRED: 3 to 7 patterns drawn on 8 1/2" by 11" clear paper
2 to 4 sheets of 8 1/2" by 11" clear paper for each student

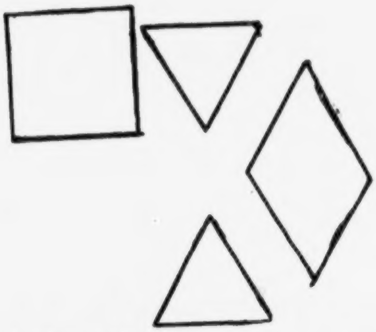
ADDITIONAL RESOURCES:

4.2.4

DRAWING PATTERNS

__Preparation__: Make simple patterns, each on a single piece of paper. Make enough for the time you want to spend on this activity. Some examples:





__Directions__: Have one student hidden from view of the others. Give this student one of the patterns. He/she is to describe what is on the paper so that the other students can draw an identical pattern on their sheets. Again, this is one way communication. Only the student with the pattern can speak and the other students do not give any feedback to the speaker. When the speaker has completed his directions, compare the original with the other drawings. Discussion - Did the students learn communication skills from Part 4.2.3? At what points did the speaker mislead the listeners? Did the listeners become frustrated? Would we make very good computers? How could this "radio communication" be improved? Challenge other students to be the speaker.

Other types of one way communication activities can be done as the one above. Books on paperfolding can be used by the teacher to master a particular pattern. Then have a student give directions to the others by __watching__ the instructor fold the pattern. Or, for a more destructive approach, give each student a piece of graph paper and scissors. Have the "talker" give directions to the others on how to cut and fold the paper to copy his pattern. Again only one way communication is allowed. The destructiveness of cutting requires that the directions be clear the __first__ time!

From: __What to do Until the Computer Comes__ by Allan Dunn.

4.3.1
Reference No.

ACTIVITY TITLE: Do Computers Have Feelings?

OBJECTIVE: The student will be aware that computers do not possess human emotions.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*		

DESCRIPTION: Have the students (or teachers) type in phrases such as "I Love You", or "I hate you."

Look at the computer's response and discuss whether the computer shows feelings.

EXTENSION: Use the program Eliza that appears to have human emotions and have students enter various responses and see what the reaction is.

MATERIALS REQUIRED: Microcomputer

ADDITIONAL RESOURCES: Eliza is available along with Haiku and other public domain programs on an Apple DOS 3.3 Disk from Creative Consulting, 13830 SW 114, Tigard OR 97223. They are only $5 per disk includes disk, duplication service, and postage.

4.3.2
Reference No.

ACTIVITY TITLE: Do Computers Have Human Emotions?

OBJECTIVE: The student will be aware that computers do not possess human emotions.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Have a discussion with the class about the topic, "Do Computers Have Feelings." Develop a list of emotions and check if computers exhibit these.

Discuss whether computers in the future will ever possess feelings (are R2 D2 and 3 CPO a possibility?).

MATERIALS REQUIRED:

ADDITIONAL RESOURCES: Run Eliza program that appears to have human responses and discuss whether this shows that computers have feelings.

4.3.3
Reference No.

ACTIVITY TITLE: Crack-Up

OBJECTIVE: The students will be aware that computers do not possess human emotions.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: In a "back-door" kind of entry to the above goal, the student can discuss human emotions and qualities that do not apply to computers, and then the student should try to create simple jokes using the attached copy as a starting point.

MATERIALS REQUIRED: Paper
Pencil

ADDITIONAL RESOURCES: READ, Magazine, Vol. 31, No. 16, April 21, 1982.

CRACK-UPS

1. What did the robot say to the vacuum sweeper?

   Stop acting like an idiot and pick your nose up off the floor.

2. How did the robot eat the Apple?
   Bit by Bit until the last Byte demolished the Core.

3. What did the robot say when it saw the shopping cart in the lady's front yard?

   Hey kid! You're sure a long way from home.

SOME POSSIBLE BEGINNINGS

1. What did the robot say

2. What did the robot think when

3. What did the computer do when

4. Why did the young robot eat

5. Why did the robot turn off the

6. How do robots feel when

7. When do robots

8. What is the motto of

4.3.4
Reference No.

ACTIVITY TITLE: The Intelligent Person

OBJECTIVE: Recognize characteristics that distinguish machine artificial intelligence from human intelligence.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*			

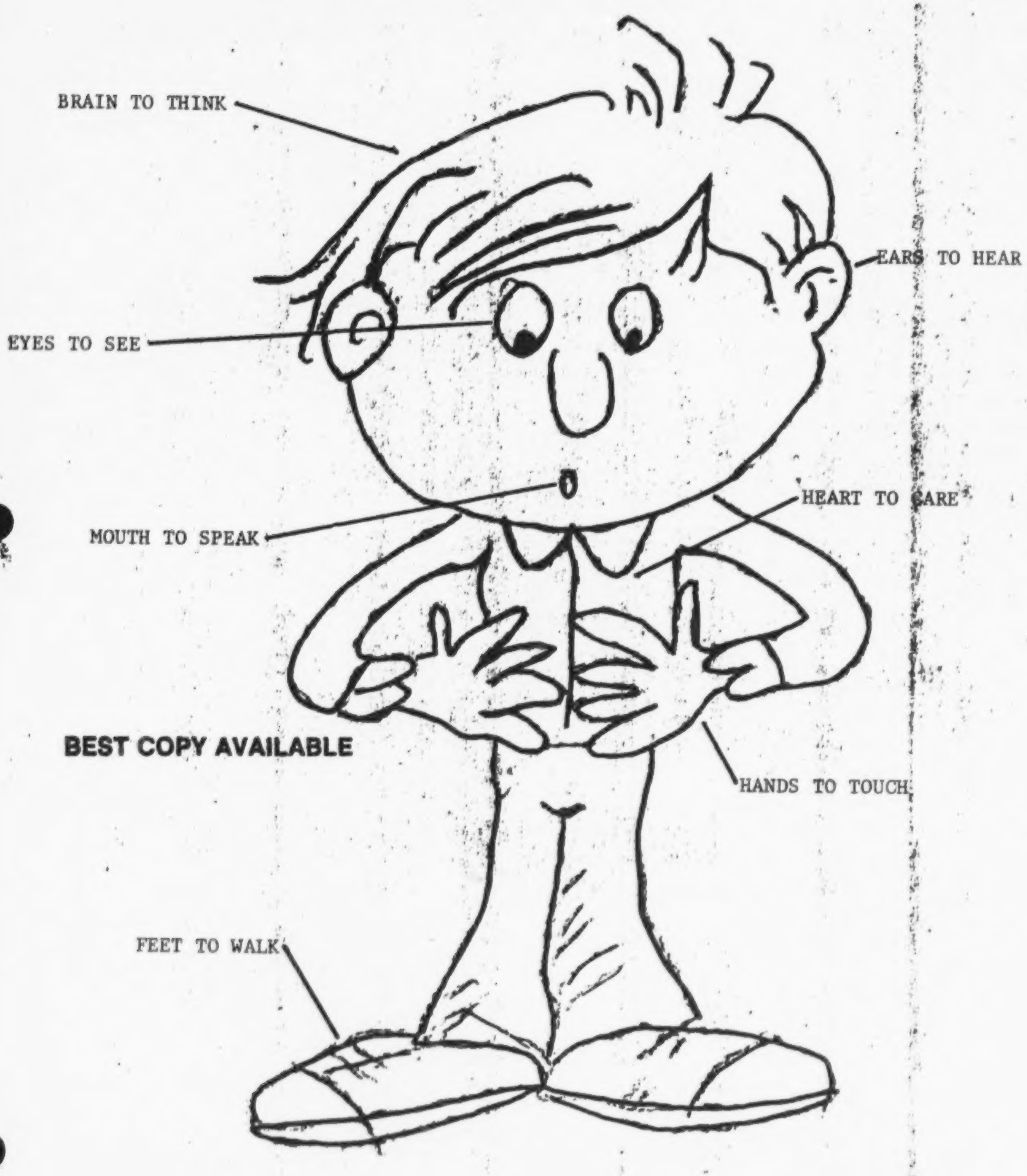
DESCRIPTION: Give students a copy of "The Intelligent Person". Have them label the parts after class discussion of what makes a human "human"! Then try to find the comparable parts in a computer.

MATERIALS REQUIRED: Classroom set of copies of "The Intelligent Person"
Computer

ADDITIONAL RESOURCES:

From: Rosemary Hurdle, Colton Elementary School #53.

THE INTELLIGENT PERSONS


BRAIN TO THINK
EARS TO HEAR
EYES TO SEE
HEART TO CARE
MOUTH TO SPEAK
HANDS TO TOUCH
FEET TO WALK

BEST COPY AVAILABLE

4.4.1
Reference No.

ACTIVITY TITLE: If The Shoe Fits

OBJECTIVE: The student will identify common tasks which are not suited to computer solution.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	*

DESCRIPTION: The instructor should either have a shoe available or take one off and set it on the computer. Tell students that you would like for the computer to tie your shoe for you. Discuss the things which need to be done to have the computer accomplish this (i.e., add arms, hands, program, etc.). With this done ask the question, "Is it worth it to use a computer for this task? Why? Why not?" Follow-up with a brainstorming session to list other tasks which aren't appropriate for the computer.

MATERIALS REQUIRED: Shoes that tie

ADDITIONAL RESOURCES:

4.4.2
Reference No.

ACTIVITY TITLE: Computer Use?

OBJECTIVE: The student will identify common tasks which are not suited to computer solution.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	

DESCRIPTION: Brainstorm activities that the student could do. Determine which tasks the computer could do. Then decide if the tasks the computer could do, should be done by the computer, i.e., is it an approximate use of the computer?

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

4.5.1
Reference No.

ACTIVITY TITLE: What Factors Encourage Or Inhibit Computer Use?

OBJECTIVE: The student will discuss social and technological factors that contribute to or inhibit future development of computer applications.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Students read statements about social and technological factors relating to computer use, and decide whether these inhibit or encourage computer use.

A class discussion should take place around these statements and, specifically, how these factors inhibit or encourage computer applications.

MATERIALS REQUIRED: Student activity worksheet (the answers may vary depending on student opinions)

ADDITIONAL RESOURCES: Future Shock by Alvin Toffler.

4.5.1

WHAT FACTORS ENCOURAGE OR INHIBIT COMPUTER USE?

Read the following statements and decide whether they encourage or inhibit future computer use.

1. Robots have increased productivity and freed workers from dangerous and boring jobs.

2. Computers and robotics have created new jobs requiring technical skills but have eliminated jobs which required unskilled or skilled workers.

3. Computers can operate at speeds millions of times faster than the human brain and solve problems that would take years for a person to solve by hand.

4. In the future, some banks hope that people will not use cash for purchasing goods. All money transfers will take place through electronic fund transfer.

5. Computer advances have been developed through military research in the past.

4.6.1
Reference No.

ACTIVITY TITLE: I Would Like ____________________________

OBJECTIVE: The student will discuss future computer applications.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	*

DESCRIPTION: On the board write, "I would like the computer to ____________________________." Have groups of students brainstorm different things that they would like for the computer to be able to do. After an appropriate period of time have students decide on the idea which appeals to them the most. They should then prepare a presentation for the entire group, as if their computer application was reality. The presentation should try to sell this computer application to the rest of the class. Students may wish to develop a poster or some other form of media to help present their idea. Follow-up with a discussion of the feasibility of each of the ideas presented. Will they exist in 5 years? 10 years? 20 years? 30 years?

MATERIALS REQUIRED: Pencils
Paper
Optional: Construction paper
Paper
Crayons
Glue
Magazines

ADDITIONAL RESOURCES:

4.6.2
Reference No.

ACTIVITY TITLE: Possible Or Impossible?

OBJECTIVE: The student will discuss future computer applications.

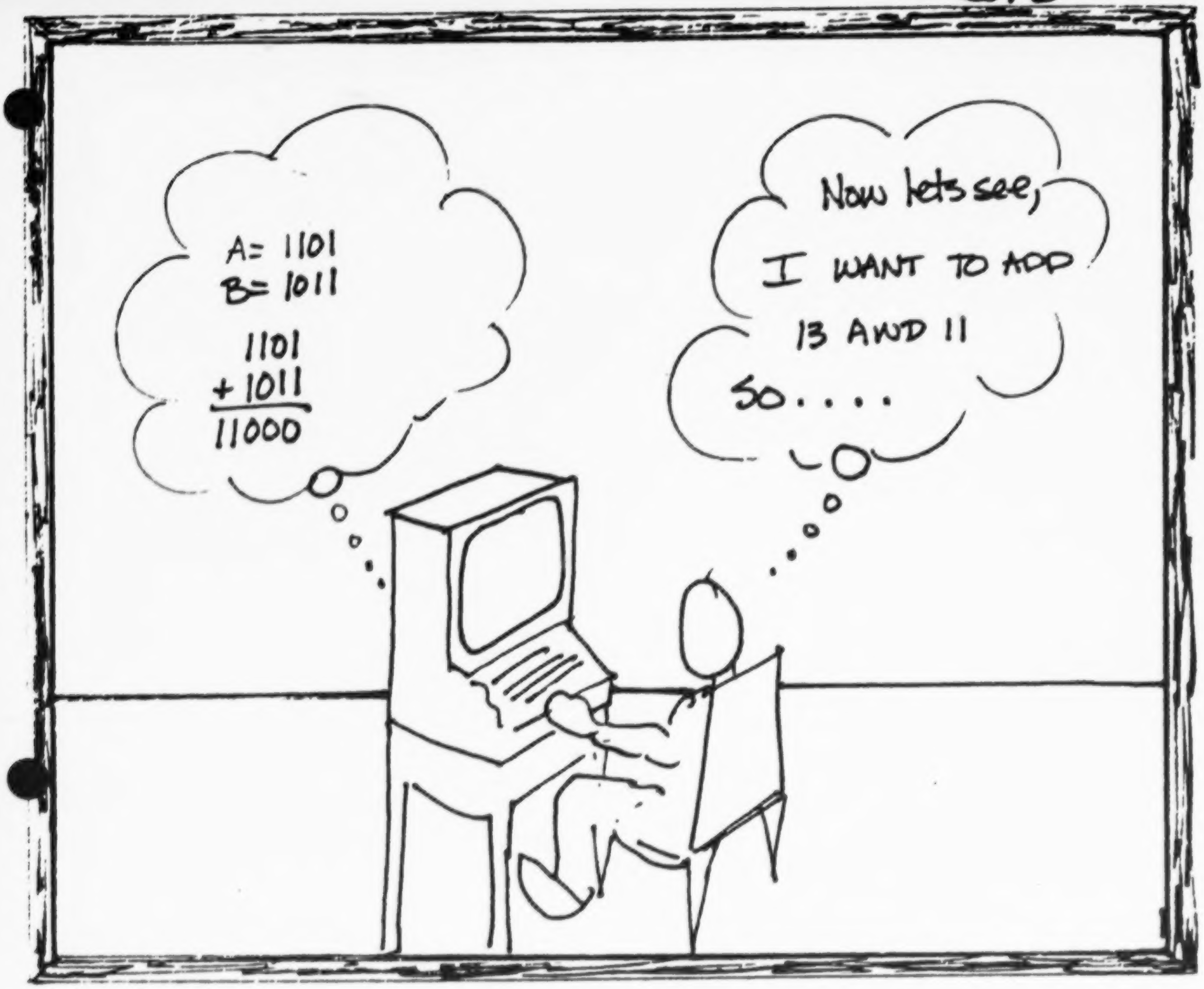
GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	*

DESCRIPTION: Take a few minutes with students to list all of the futuristic uses of computers that they have either seen in the movies or read about (i.e., robots like R2 D2, spacecraft, cashless system using only direct computer transfers of funds, etc.). Next, go through this list and decide which ones are possible and which are impossible. Take the list of possiblities and try to arrive at a consensus on how many years before it will be developed. (Maybe use categories like 5 years, 10 years, 20 years, 25 plus years.)

MATERIALS REQUIRED:

ADDITIONAL RESOURCES: OMNI and the Futurist magazines provide many articles looking at futuristic topics.

3.0


A= 1101
B= 1011
1101
+ 1011
11000
Now lets see,
I WANT TO ADD
13 AND 11
SO....

The student will learn a vocabulary of common computer terms.

SCOPE AND SEQUENCE

The X indicates instruction for that level should occur.

5. The student will learn a vocabulary of common computer terms.

We recommend that vocabulary not be taught in isolation, but in conjunction with other concepts, specifically, goals 6 and 7.

	K-3	4-6	7-8	9-12
The student will define and spell:				
5.1 Terms related to background information such as abacus, binary, punch card, and codes (Hollerith, ASCII, etc.).		X	X	X
5.2 The terms "hardware" and "software" and differentiate between the two.		X	X	X
5.3 Terms related to hardware such as computer, calculator, electronic games, mini, micro, and main frame computers.		X	X	X
5.4 Terms related to the function of a computer such as memory, input, output, arithmetic unit, control unit and C.P.U.		X	X	X
5.5 Terms related to software such as program, languages (BASIC, Logo, etc.) and language types.			X	X
5.6 Terms related to programming and operation such as run, load, save, boot, bug, debug, and data base.	X	X	X	X

5.0.1
Reference No.

ACTIVITY TITLE: Computer Literacy Exam

OBJECTIVE: To assess the degree of computer literacy.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: This is a comprehensive multiple choice test which can be used as a pre-course activity as well as a post-course assessment.

MATERIALS REQUIRED: One copy of the test per student

ADDITIONAL RESOURCES: Are you Computer Literate?

Answers to computer literacy exam:

1. b
2. d
3. a
4. b
5. a
6. a
7. c
8. c
9. b
10. c
11. d
12. d
13. d
14. b
15. c
16. c
17. c
18. b
19. b
20. c
21. d
22. d
23. c
24. b
24. a
26. b
27. a
28. c
29. b
30. d
31. c
32. a
33. c
34. d
35. d

COMPUTER LITERACY EXAM

Circle the best response of the four choices listed to complete each statement.

1. What is computer literacy? Is it:

   a. The ability to write computer programs?
   b. Knowing what a computer can and cannot do, how computers are used, and how they may change our lives?
   c. Knowing computer-related vocabulary, so you can read, write, and talk about computers?
   d. Understanding how to build a computer?

2. The first general purpose electronic digital computer became operational:

   a. Shortly after Ben Franklin performed his famous experiment using a kite and lightening.
   b. Shortly after the invention of the telephone.
   c. About the time the first television set was built.
   d. Shortly after the end of World War II.

3. A task quite suited to a computer is:

   a. To print out "personalized" form letters for advertising purposes.
   b. To take off, pilot, and land a small plane flying from San Francisco to Los Angeles.
   c. To analyze an X-ray and recommend a course of treatment for any disease it detects.
   d. To take over most functions currently performed by teachers.

4. A good way to think about computers is:

   a. It is impossible for a computer to tell a lie.
   b. Computers are built and programmed by people and these people should be responsible for what computers do.
   c. Anything a human can do a computer can do better.
   d. Any problem that can be solved by a computer should be, since a computer cannot make a mistake.

5. A good definition of a computer is:

   a. An electronic automated device that can solve problems involving words and numbers.
   b. A superspeed pocket calculator.
   c. A machine that uses binary numbers to do math problems.
   d. Any machine that can add, subtract, multiply, and divide numbers.

6. When we say a computer "understands" an instruction we mean:

   a. The computer can execute (carry out) that instruction.
   b. The computer can explain the meaning of that instruction.
   c. The computer's keyboard has a key corresponding to the instruction.
   d. It can print out a definition of the instruction.

7. A magnetic disk pack:

   a. Is usually considered to be primary storage.
   b. Spins at 33 1/3 revolutions per minute.
   c. Can store a very large number of characters in a relatively small space.
   d. Costs about the same as a magnetic tape cassette.

8. A modern large scale computer can perform about how many multiplications in one second?

   a. 100 to 1,000
   b. 10,000 to 100,000
   c. 1,000,000 to 10,000,000
   d. 100,000,000 to 1,000,000,000

9. The Jacquard loom is:

   a. A bird found in southern France and northern Italy.
   b. A weaving machine that uses punched cards to specify the raising and lowering of threads.
   c. The first computer-controlled loom, built in the early 1950s.
   d. A machine for automatically producing mathematics tables.

10. Herman Hollerith is best known for:

   a. Serving as president of IBM from 1902 to 1942.
   b. Building the first mechanical computer, called an analytical engine.
   c. Developing punched cards and data processing ideas used to process the U.S. Census data for 1890.
   d. Building the first relay computer in the 1930s.

11. The typical modern computer:

   a. Contains more than 10,000 vacuum tubes.
   b. Uses small magnetic cores for its secondary storage.
   c. Uses magnetic tape and/or disk for primary storage.
   d. Makes use of large scale integrated circuitry, called chips.

12. John van Neumann is well known for his contribution to:

    a. Design of computers
    b. Help in developing game theory
    c. Mathematics
    d. All of the above

13. If a computer program is quite short (less than 20 statements long) we can conclude:

    a. It will take less than one second to run on a computer.
    b. It is bug-free, since it is so short.
    c. It is not long enough to perform a useful task.
    d. None of the above.

14. Information to be processed by a computer is called:

    a. Records
    b. Data
    c. Intelligence
    d. Files

15. Most errors blamed on computers used in business are actually due to:

    a. Hardware problems
    b. Programming errors
    c. Data preparation and data entry errors
    d. None of the above

16. Key to tape and key to disk refer to:

    a. The locks found on most tape and disk cabinets.
    b. Indexes used in retrieving information from tape or disk.
    c. Data entry devices.
    d. Output devices.

17. A flow chart is best defined as:

    a. A chart or record showing weekly flow of programs through a computer.
    b. A diagram showing the flow of electricity through a computer memory.
    c. A two-dimensional picture, using boxes and connectors, showing a step-by-step set of directions.
    d. A computer-produced analysis of the steps needed to solve a problem.

18. BASIC is an example of:

    a. A language all computers understand.
    b. A language designed to be read and used by both people and computers.
    c. A natural language.
    d. A programming language most often used in business applications.

19. If a mail delivery robot working in an office building finds an obstacle in its path, it is most apt to:

    a. Blow a fuse.
    b. Signal for help.
    c. Remove the obstacle.
    d. Climb over the obstacle.

20. A thermostat is an example of:

    a. A microcomputer.
    b. An information retrieval machine.
    c. A process control device.
    d. Artificial intelligence.

21. A walking, talking robot is most likely to be found:

    a. Working in a modern factory.
    b. Teaching in a school or university.
    c. Working as a computer operator.
    d. In a science fiction movie.

22. Computer applications for information retrieval include:

    a. Supermarket checkout systems using UPC.
    b. Airline reservation systems.
    c. Computerized search of medical literature.
    d. All of the above.

23. Currently the people making the most use of full text searching are:

    a. Airline reservation clerks
    b. Police
    c. Lawyers
    d. English teachers

24. Data processing is:

    a. Any use of computers that produces data.
    b. The collection, storage, and processing of data to produce needed reports.
    c. The retrieval of data stored in a computerized data bank.
    d. All applications of computers outside the field of business.

25. A computer program for a mathematical model is called:

    a. A computer simulation.
    b. Artificial intelligence.
    c. A large scale integrated circuit.
    d. Computer graphics.

26. Word processing refers to the use of computers to:

    a. Alphabetize the words going into a new dictionary.
    b. Help automate a typewriter.
    c. Solve word puzzles.
    d. Try out various letter combinations in order to create new words.

27. Most things computers do:

    a. Can be done in other ways.
    b. Can only be done by computers.
    c. Can be done more cheaply if larger computers are used.
    d. Can be done more reliably by hand.

28. At the current time computers are:

    a. Able to take over most functions of a first grade teacher.
    b. Handling much of the administrative work in secondary schools.
    c. Becoming commonplace in medical education.
    d. Too expensive to use in schools.

29. With respect to computers and automation, it is correct to say:

    a. Computers are primarily responsible for our current levels of unemployment.
    b. Computers have helped wipe out many jobs but have helped create other jobs.
    c. That each computer displaced 15-20 workers.
    d. Computers are creating about two million jobs a year.

30. Large scale or national data banks are not a threat to privacy because:

    a. Truth cannot hurt people.
    b. They are prohibited by law.
    c. They are used only for our benefit.
    d. None of the above is correct.

31. The first step in using a computer library program to solve a problem is to:

    a. Gather all data and facts relevant to the problem.
    b. Find a computer library program designed to solve the problem.
    c. Understand the problem.
    d. Write the necessary program and place it in a computer library.

32. Computers can play checkers and chess fairly well, but currently they are not very good at:

    a. Language translation.
    b. Medical diagnostic work.
    c. Teaching students simple arithmetic.
    d. Storing and retrieving large amounts of information.

33. In solving a problem, a computer:

    a. Thinks much like a person.
    b. First has to understand the problem.
    c. Follows a program, written by people.
    d. Usually recalls the answer from memory.

34. Which of the following abbreviations is not commonly used in computer science?

    a. CRT
    b. IBM
    c. UPC
    d. ECT

35. A computer program:

    a. Lists instructions to the computer operator.
    b. Is about the same thing as a flowchart.
    c. Is a television program about computers.
    d. Contains exact instructions for each step needed to solve a certain type of problem.

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From: Are You Computer Literate? pages 133-139.

5.0.2
Reference No.

ACTIVITY TITLE: Glossary

OBJECTIVE: The student will learn a vocabulary of common computer terms.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	*

DESCRIPTION: A computer glossary for reference use with vocabulary activities.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES: Are You Computer Literate?

GLOSSARY

Abacus. An ancient calculating device consisting of a frame with rods on which beads are moved.

Access Time. A time required to gain access to needed data. A modern computer can access data from storage very quickly. Examples: from primary storage - less than 1 microsecond; magnetic disk - 25-100 milliseconds; magnetic tape - 50 milliseconds to several minutes.

Algorithm. A finite, step-by-step set of directions designed to solve a particular type of program. Computers can sometimes carry out some of these steps. Examples are long division, square roots, or others that are studied in mathematics courses.

Alpha Numeric. Refers to the digits 0-9, letters and other symbols on the keyboard.

Analog Computer. A kind of computer that uses continuously varying quantities such as length, voltage, current, or weight to represent and solve problems. Analog computers are often used by scientists and engineers.

Analytical Engine. A mechanical computing device that was designed by Charles Babbage in 1835 but never built. It was a forerunner of today's modern computer.

Arithmetic and Logic Unit (ALU). The central processing unit of a computer consists of two main parts. One part, called the control unit, figures out the meaning of the instructions in a program. The other part, called the arithmetic and logic unit, actually carries out the instructions. The ALU is much like a superspeed calculator.

Artificial Intelligence. The branch of computer science that develops computer systems to do intelligent-like tasks, such as game playing, question answering, language translation, carrying on a conversation.

BASIC. Beginners All-purpose Symbolic Instruction Code. The most widely used computer programming language in elementary and secondary schools. It was designed to be easy for students to use in solving problems.

Bar Code Reader. An input device that "reads" the bar code symbols.

Binary. Consisting of two parts of two things. Binary arithmetic uses two symbols, 0 and 1, to represent numbers. Most computer storage devices are designed to store binary digits, and the computer circuitry is designed to manipulate information coded in a binary form.

Binary Digit. One of the symbols 0 or 1. Often abbreviated as bit. A sequence of binary digits can be used as a code for letters or numbers to be processed by a computer.

Bit. See binary digit.

Bug. An error - usually in a procedure or in a computer program. However, it can also refer to a hardware error.

Business Data Processing (BDP). The use of computers to process the types of data needed in running a business. See also Data Processing.

Calculator. A device for carrying out calculations. A pocket calculator is not a computer, but can do arithmetic. A calculator has provisions for inputting data, specifying the operations to be performed and outputting answers.

Cathode Ray Tube (CRT). The type of vacuum tube used as the picture tube in a TV set, and as the display screen in many computer terminals.

Central Processing Unit (CPU). This is the heart of a computer system. It consists of the control unit and the arithmetic and logic unit. In a microprocessor the CPU may be built into a single chip.

Character. A letter, digit, punctuation mark, or other symbol. An electronic digital computer is designed for the input, storage, manipulation, and output of such characters.

Chip. Integrated circuits and large scale integrated circuits are manufactured on a small "piece" of silicon. Such a circuit can contain many thousands of transistors and related electronic components, and is often called a chip.

Circuit. A path through which electrical current flows.

Command. A word or phrase in a programming language which instructs the computer to do something. "PRINT" is a command used in BASIC.

Computer. A device that can input, store, manipulate, and output data. It can automatically follow a program (a detailed step-by-step set of directions). Two major categories are Analog Computers and Digital Computers.

Computer Graphics. The use of computers to deal with a graphics display screen as a common input/output device for computer graphics. Pen-and-ink plotting devices are also commonly used.

Computer Operators. A person who runs a computer.

Control Unit. One of the two main parts of the Central Processing Unit. It directs all activity of the computer system.

Core. A very common form of primary memory or storage. It is an iron, donut-shaped ring, about 1 mm in diameter. Sometimes the primary memory of a computer is called Core Memory even though it does not contain cores, but instead is made up of transistorized devices (chips).

COBOL. A widely used programming language called Common Business Oriented Language. It was developed in 1960 to meet the specific needs of the Business Data Processing field.

Cursor. The symbol that appears on the screen to show where the next character will be entered.

Data. Facts, recorded measurements, and other information. In the computer field, the word data usually refers to information to be processed by a computer.

Data Bank. A collection of data. Often this term refers to a computerized collection of information about people, and occurs in a discussion of privacy and security.

Data Processing. The processing of (raw) data to produce information and reports and/or to solve problems. If it is business data, the process is called Business Data Processing.

Debug. To remove the bugs (errors) from a procedure or computer program. Key ideas include detecting the presence of a bug and locating its precise cause.

Dedicated Processor. A one function processor such as those used in a microwave.

Digital Computer. A kind of computer that uses characters (digits, letters, punctuation marks) to represent data and programs. A digital computer can be thought of an an automated character manipulation machine.

Disk. A storage device consisting of a flat circular rotating surface coated with magnetic iron oxide. It is usually used as secondary storage and looks like a phonograph record. Access time to a disk is about 25 to 100 milliseconds.

Disk Drive. An input/output device that loads data into the computer or saves data from the computer on a disk.

Electromechanical. An electrically powered device with many mechanical, moving parts. Some early calculators were powered by a hand crank. Replacing the hand crank with an electric motor made them electromechanical calculators.

Electronic Funds Transfer (EFT). The transfer of money from one account into another via electronic technology. For example, after computer terminals read a buyer's credit card, money is transferred from the person's bank account to the store's bank account.

ENIAC. The Electric Numerical Integrator and Calculator which was the first general purpose electronic digital computer. It was built at the University of Pennsylvania and became operational in December 1945.

Ergonomics. The study of people and machines interacting in the office environment.

File. A collection of related records treated as a unit. For example, detailed information about one student might constitute a record, and all record for one school might constitute a file.

Floppy Disk. A magnetic storage device commonly used with microcomputers.

Flowchart. A diagram consisting of various shaped boxes and connectors to display a procedure. A flowchart gives a two dimensional picture of the steps of a procedure.

FORTRAN. A programming language whose name is derived from the words (FOR)mula (TRAN)slation. It is used in science and engineering applications.

Full Text Searching. The retrieval of certain information by searching the full text of an article or book stored in a computer's secondary memory. The computer finds the information by looking for desired words or phrases.

Graphics. See Computer Graphics.

Handcopy. Paper output from a printer or plotter printout.

Hardware. The physical machinery of a computer system. It includes the central processing unit, primary storage, secondary storage, input devices, and output devices.

Infinite Loop. Set of instructions that continuously repeat in a program.

Information Retrieval. A branch of computer science having to do with the storage and retrieval of information. Generally it is concerned with large files of information (data banks).

Instruction. A step of a computer program, which a computer is designed to carry out. Examples of instructions could be to add two numbers or to access data stored on a disk.

Input Device. A part of a computer system that puts information in the computer s memory. The keyboard, joystick, and light pen are examples of light pens.

Integrated Circuit. See Chip.

K. K stands for kilo or 1000 used when referring to memory size (48k).

Keyboard Terminal. A computer input and output device with a typewriter-like keyboard and a display mechanism (paper or CRT).

Keypunch. A device used by a person to punch holes (representing characters of information) into a card, so the card can be read by a card reader.

Large Scale Integrated Circuit (LSIC). A circuit consisting of many hundreds or thousands of transistors and other electrical components, and manufactured as a single unit. See Chip.

Light Pen. An input device that responds to light on the video screen and is shaped like a pen.

Line Printer. A computer output device that seems to print an entire line at a time. Speeds of 300-1800 lines per minute are common, and line lengths can be 80 to 132 characters long. Thus, such printers may be hundreds of times as fast as a human typist.

Loop. A sequence of instructions that causes an activity to be performed repeatedly. The repetition may continue indefintely (an indefinite loop) or until some predetermined condition is satisfied (a conditional, or finite loop).

Machine Language. The instruction set a computer is designed to be able to "understand". Instructions in machine language can be stored in a computer's memory, interpreted by its control unit, and executed by its arithmetic and logic unit.

Magnetic Core. See Core.

Magnetic Ink Character Recognition (MICR). The use of ink containing magnetic particles so that printed characters can be ready by a machine. The most common use is on bank checks.

Magnetic Disk. See Disk.

Magnetic Tape. The magnetic tape used for secondary storage on a computer system. It is much like that used on a home tape recorder, although it often is of higher quality. Recording densities of 800, 1600, or 6250 characters per inch are common. Thus, a large reel of tape can store many millions of characters of information.

Mainframe. A computer system's hardware consists of a mainframe and peripherals. The mainframe includes the central processing unit and primary storage.

Mathematical Model. A model employing mathematicl formulas. An example is E = mc2 which relates energy, mass, and the speed of light. See Modeling.

Memory. A computer's storage device(s). Most computers have a primary memory with very fast access which is relatively small, and secondary storage which can contain a large number of characters of information, but has slower access time. See also Core, Magnetic Tape, and Disk.

Microcomputer. A "small" computer. Sometimes referred to as a personal or home computer.

Microprocessor. A one-chip central processing unit.

Microsecond. One-millionth of a second. A modern computer can access information in its primary memory, or add two numbers, in less than one microsecond.

Millisecond. One-thousandth of a second. Useful in discussing speeds of computer peripherals such as input/output devices and secondary storage. The access time for disk might be 25 to 100 milliseconds.

Minicomputer. A "medium" size computer.

Modeling. The process of accurately describing or representing certain parts of a system. A key aspect of science, used to state what will happen under a particular set of circumstances. See Simulation.

Modem. A device for connecting a terminal to a computer over a phone line.

Nanosecond. One-billionth of a second. A very fast modern computer can access main memory or add two numbers in a few nanoseconds. In one nanosecond, light (in a vacuum) travels a little less than one foot, or electricity in a wire travels about nine inches. Thus, very fast computers must be physically small.

Optical Character Recognition. The machine reading or typewritten or handwritten characters. The typewritten or careful handwritten materials are now commonly read by computers, but computer reading of general human handwriting is still a research problem.

Optical Mark Reader. The machine reading a mark sense cards or sheets. Often used for scoring tests of recording grades.

Output Device. A device which displays output from a computer. Printers, CRTs, and Plotters are examples.

PASCAL. A modern programming language, developed for computer science instruction.

Password. A word or set of characters to gain access to a computer or a part of a program.

Peripheral Equipment. A computer system consists of a mainframe and peripheral equipment. Peripherals include secondary storage, card reader, line printer, and other input/output devices.

Plotter. An output device that draws pictures on paper.

Primary Storage. The fast-access part of a computer's memory system. It operates at a speed comparable to the arithmtic and logic unit. It is generally much smaller in storage capacity then the secondary storage part of the memory system.

Printer. An output device that prints output on paper.

Printout. The output from a printer. Also called hardcopy.

Procedure. A finite step-by-step set of directions that can be mechanically interpreted and carried out by some agent. Computer science is concerned with situations in which the agent is a computer, or perhaps a human assisted by a calculator, a computer, or a robot-like device.

PROM. Programmable ROM. A chip which can be programmed.

Process Control. The use of machinery (perhaps computers) to control a process. It involves the input of data that represents measurements on the process, processing of the data to decide upon appropriate action, and automatically taking the action.

Program. A detailed step-by-step set of directions telling a computer how to perform a procedure. It may be written in a high level language such as BASIC or COBOL, or in a particular computer's machine language. The words "program" and "procedure" are sometimes used interchangeably.

Programmable Calculator. A calculator-like device with certain computer-like features. A programmable digital calculator can store a program (a sequence of key strokes) in its primary memory or in secondary storage, and can execute a stored program. Such machines are well suited to certain science, engineering, and business computations.

Programmer. A person who writes computer programs.

Punch Card. A card that can be punched with holes that can stand for letters, numbers, or symbols. The holes represent information that can be used to control machines. A keypunch machine is used to punch the character codes into a card.

RAM. Random Access Memory. Temporary memory in computer.

Read/Write Head. A unit inside a disk drive that reads or writes information into a disk.

Record. A group of related pieces of computerized information. For example, a student's transcript might be one record, and the collection of all transcripts for a school might be one file.

Reel-to-Reel Tape. A type of input/output device.

Relay Computer. A computer making use of electromagnetic switches to carry out computation. It was built in the 1930's and early 1940's before the much faster electronic computer was developed.

Remote Terminal. A computer input/output device that is located some distance from the computer. It is generally in another room or building or even another city.

Robot. A machine or device that works automatically. It usually carries out limited tasks but it can be made more versatile when a computer is used in it.

ROM. Read Only Memory. Permanently stored information in the computer's memory.

Scanner. An input device that reads Universal Product Codes on packaged products.

Secondary Storage. The slow access part of a computer's memory system. It may consist of magnetic disks, magnetic tape devices, bubble memory, and/or charge-coupled devices.

Silicon. Element from which chips are made.

Simulation. Carrying out the steps or computations of a model in order to determine what will happen in a given set of circumstances. When done by use of a computer, it is called computer simulation. See Modeling.

Spreadsheet. A display of a budget or other statistical information. Computer versions such as VisiCalc are used extensively.

Statement. See Command.

Software. Computer programs. Examples include programs written by students as well as much larger programs such as a BASIC or COBOL translator.

Tape Drive. An input/output device that reads and stores data on magnetic tape.

Tape Recorder. An input/output device that uses cassettes for storage.

Terminal. An input or output device. See Keyboard Terminal.

Text. Numbers, letters, and symbols.

Timesharing. A method of computer usage, or type of computer system where many people use the computer at the same time. The computer system shares its resources among its users through different terminals.

Translator. A computer program that translates instructions written in a language such as BASIC or COBOL into a form the computer hardware understands.

Universal Product Code (UPC). The dark colored parallel lines on a grocery item (containing the company number and the item number of the product). It can be read by a laser reading device and input to a computer.

User. A person who is using a computer system.

Voice Synthesizer. An output device which translates computer output into human sounds.

Word Processing. The use of computers to help automate a typewriter. Materials are typed and stored in a computer memory where they can be changed. Final copy is then typed out very quickly by the computer.

5.0.3
Reference No.

ACTIVITY TITLE: TRON

OBJECTIVE: The student will learn a vocabulary of common computer terms.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: See TRON Retread 3.5.6

MATERIALS REQUIRED: Rental of the movie, TRON

Student activity worksheet

ADDITIONAL RESOURCES: See related activity 3.5.6.

5.0.3

TRON RETREAD

I. The following quotes are from the movie "TRON" and are listed pretty much in the order that they appeared in the movie. Each of these statements are fairly common computer terms. Do the following with each one of the statements:

1. Identify the person who spoke the word or words. If more than one person used the word or phrase, list any one of them.

2. Identify what each computer related word or phrase means in common terminology. In other words, translate what was said so that a non-computer type could understand what was meant.

Word or Phrase	Who Said It	What It Means
1. "..user.."		
2. "..bits blasted out of you.."		
3. ".....200 microseconds"		
4. "..microcircuits.."		
5. "..find that file.."		
6. "..merge with memory.."		
7. "..scussy date.."		
8. "..stolen password.."		
9. "..priority password.."		

10. "..hacking.."

11. "..breakin.."

12. "..software engineer.."

13. "..read up his file.."

14. "..MCP.."

15. "..program was running.."

16. "..terminal.."

17. "..new program off-line.."

18. "..serve your system.."

19. "..identify disk.."

20. "..imprint.."

21. "..RAM.."

22. "interrupt interface.."

23. "..input-output tower.."

24. "..digital beam transport.."

25. "..logic probe.."

26. "..interface located at its base.."

27. "..bitbrain.."

28. "..power surge.."

29. "..nanoseconds.."

30. "prepare to terminate.."

SHORT ANSWER RESPONSE

Directions: Answer the following questions based on your viewing of the movie.

1. What does the tank represent in the early segment of "TRON"? What is it trying to find?

2. What words are said by the floating bit that is in the tank?

3. What file is Flynn looking for?

4. Why doesn't Master Control like the "Tron" program?

5. Why doesn't the MCP destroy the file that Flynn has been looking for?

6. What is the "religion" or "belief" that Sark and the MCP are attempting to destroy?

7. What are the three "conscripts" (Flynn, Tron, and RAM) drinking after their escape from the game grid?

8. What is the big floating ship that Sark commands?

9. Why didn't the MCP have much love for Dumont of the Input-Output tower?

10. The movie implies that there are "good" and "evil" programs. How did the MCP become "bad"? Are there really good and evil programs?

11. After Master Control lost control, lights extended out from the control unit. What did the lights represent?

12. The last scene shows city lights. What is the significance, if any, of this last scene as it relates to the rest of the movie?

5.0.4
Reference No.

ACTIVITY TITLE: Puzzle Generation

OBJECTIVE: The student will learn a vocabulary of common computer terms.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: Students can make their own crossword puzzles and word finds by using the software listed below. Have students develop words and/or, definitions then go to the computer.

MATERIALS REQUIRED: Computer
Printer
Software

ADDITIONAL RESOURCES: MECC Teacher Utilities Disk, Vol. 1, "Word Find".

Crossword Magic
L & S Computerware
1589 Fraser Drive
Sunnyvale CA 94087

5.1.1
Reference No.

ACTIVITY TITLE: Computer Terms Crossword

OBJECTIVE: The student will define and spell: Terms related to background information such as abacus, binary, punch card and codes.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION:

1. After students have reviewed these terms in other activities, the students can fill out the matching worksheet.

2. The crossword puzzle can be completed by listing the words on the board and having students fill out the crossword puzzle.

3. Write the words on cards and answers on the back. Students can do drill using games (working in pairs, or with complete class).

MATERIALS REQUIRED: Matching worksheet
Crossword puzzle

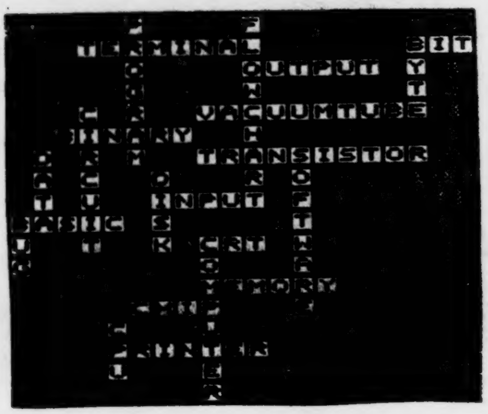
ADDITIONAL RESOURCES:

Crossword Magic
L & S Corporation
1589 Fraser Drive
Sunnyvale, CA 94087

Answer key for matching sheet:

1. d 6. e
2. f 7. b
3. i 8. i
4. h 9. g
5. k 10. c

ANSWERS: COMPUTER TERMS


TERMINAL
BIT
OUTPUT
BYTE
VACUUMTUBE
BINARY
TRANSISTOR
INPUT
BASIC
DISK
CRT
MEMORY
FLOWCHART
SOFTWARE

293

COMPUTER TERMS - MATCHING

1.____ Any number system or code based upon the symbols zero and one.

2.____ A device like a TV screen connected to a keyboard used for input and output.

3.____ A special device used to prepare data by punching holes which represent letters and digits in cards for a computer to read.

4.____ The part of a computer system which is capable of storing information.

5.____ Stands for a thousand.

6.____ A term used for facts, numbers and symbols that are used as information for a computer.

7.____ Step by step list of instructions.

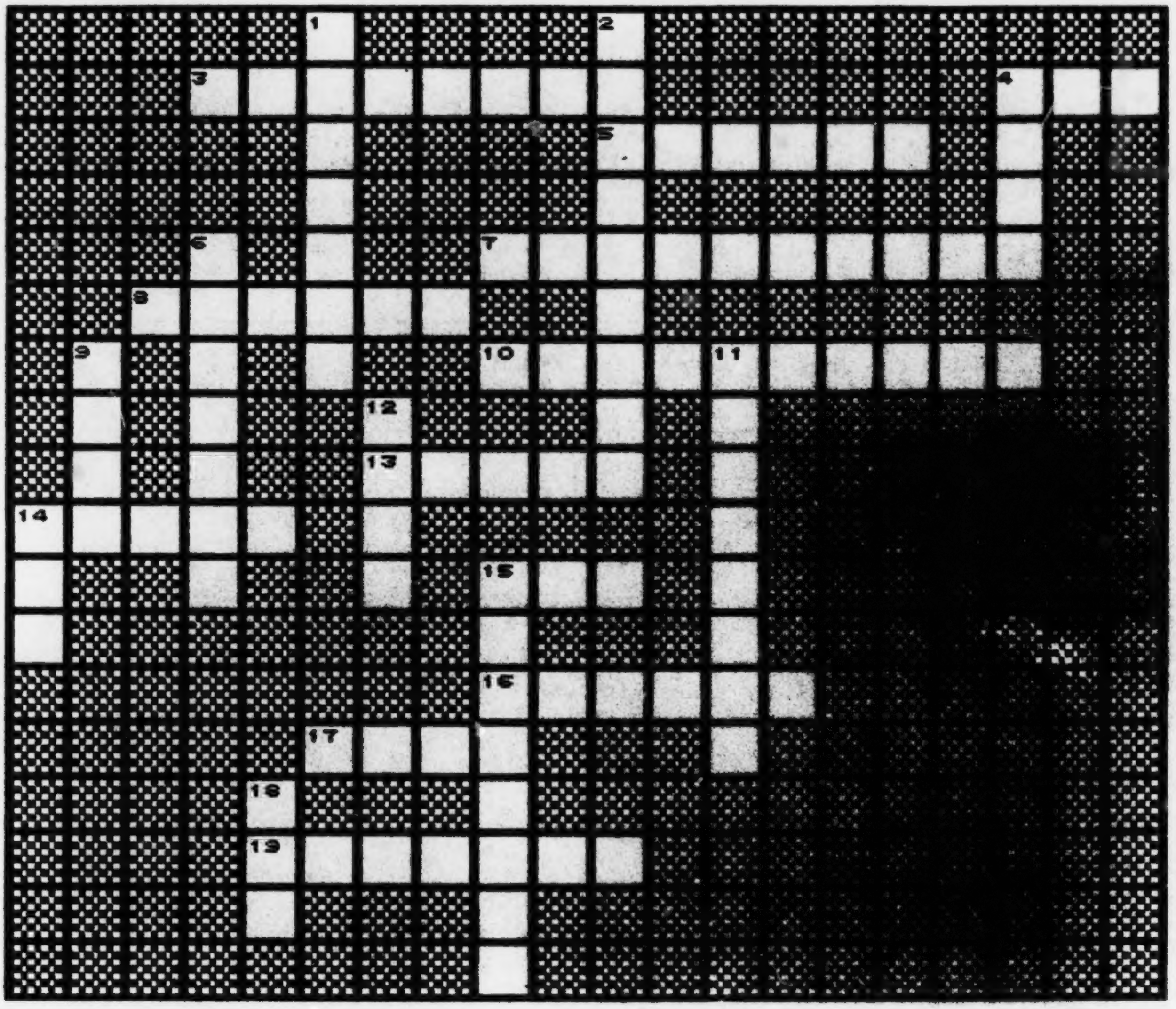
8.____ A card having 80 vertical columns in which holes are punched to represent symbols.

9.____ 8 bits -- can be a number, letter or character.

10.____ Device used by ancient Chinese and Eqyptians for counting and figuring math problems using beads on a frame.

a. Keypunch
b. Program
c. Abacus
d. Binary system
e. Data
f. CRT - Cathode Ray Tube
g. Byte
h. Memory
i. Punched card
j. Printer
k. K

COMPUTER TERMS



ACROSS CLUES

3. AN INPUT AND OUTPUT DEVICE IN THE FORM OF A KEYBOARD
4. THE SMALLEST UNIT OF INFORMATION PROCESSED BY THE COMPUTER
5. THE ANSWER, RESPONSE, OR RESULTS GIVEN BY THE COMPUTER
7. USED IN THE FIRST GENERATION OF COMPUTERS
8. A NUMBER SYSTEM BASED ON TWO DIGITS
10. ELECTRONIC DEVICE THAT ACTS LIKE A SWITCH AND CONTROLS THE FLOW OF ELECTRIC CURRENT IN A CHIP
13. INFORMATION ENTERED INTO THE COMPUTER
[illegible]. A COMPUTER LANGUAGE
15. ANOTHER ABBREVIATION FOR TV
16. A PLACE FOR STORING OR RECALLING INSTRUCTIONS AND DATA TO USE AGAIN
17. A PIECE OF SILICON WITH CIRCUITRY
19. A PIECE OF HARDWARE THAT USES PAPER, AN OUTPUT DEVICE

DOWN CLUES

1. A SET OF INSTRUCTIONS GIVEN FOR THE COMPUTER
2. A DRAWING OF THE STEPS NECESSARY TO DO A TASK
4. A GROUP OF EIGHT BITS
6. THE PATH OF AN ELECTRONIC CURRENT
9. INFORMATION
11. THE PROGRAM USED ON A COMPUTER
12. WHIRLING MAGNETIC DEVICE FOR STORING INFORMATION
14. A MISTAKE IN A PROGRAM
15. A DEVICE THAT FOLLOWS A SERIES OF DIRECTIONS
18. CENTRAL PROCESSING UNIT

5.1.2
Reference No.

ACTIVITY TITLE: Fill-In Computer Terms

OBJECTIVE: The student will define and spell terms related to background information such as abacus, binary, punch card, and codes (Hollerith, ASCII).

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: After reading definitions, students will fill in correct term from list at bottom of sheet.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: Computer literacy glossary, 5.0.2.

Answer key for fill-in computer terms:

1. abacus
2. K
3. memory
4. byte
5. program
6. binary system
7. punched card
8. ASCII
9. Hollerith
10. bit
11. computer operator
12. input
13. output
14. I/O
15. programmer

5.1.2

FILL-IN COMPUTER TERMS

1.______________ Device used by ancient Chinese and Egyptians for counting and calculating using beads on a frame.

2.______________ An abbreviation for 1000. Stands for the memory capacity of a computer.

3.______________ Part of the computer that stores programs and data.

4.______________ Group of 8 bits -- it can represent a number, letter, or character.

5.______________ A list of step-by-step instructions.

6.______________ Number system or code based upon the symbols zero and one.

7.______________ A card having 80 vertical columns in which holes are punched to represent symbols.

8.______________ A code based on 0 and 1 generally used internally by computers (American Standard Code for Information Interchange).

9.______________ Original developer of punched card system used for U. S. Census in 1890.

10.______________ Binary digit -- 0 or 1.

11.______________ Person who operates and runs computer equipment.

12.______________ Information or data of any kind that is entered into computer.

13.______________ Processed information. The answer, solution, or end result of a problem that has been solved by a computer.

14.______________ Abbreviation for input/output.

15.______________ A person who writes and debugs computer programs.

Words:

I/O
input
computer operator
abacus
program
memory
byte
Hollerith

bit
K
programmer
binary system
punched card
ASCII
output

ACTIVITY TITLE: Background Find

OBJECTIVE: The student will define and spell terms related to background information on computers.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: This word find requires students to find various computer background terms.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: Produced with MECC, "Teacher Utilities Disk".

```
              COMPUTER'BACKGROUND SEARCH 5.1.3

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. . . . . . . . . . . . . . . . . . . . . . . . .
B I N A R Y . . . . . . . S . . . . . . . . . . .
. C R T . . . . . . . . U . . . . . . . . . . . .
. . . . . . . . . . . C . . . . . . . . . . . . .
. . . . . . . . . . A . . . . . . . . . . . . . .
. . . . . . . . . B . E . . K . . . . . . D . . .
. . . . . . . . A . T . . . E . . . . . . A . . .
. . . . . . . . . Y . . . . Y . P . . . . T . . .
. . . . . . . . B . . . . . P . . R . . . A . . .
. . . . . . . . . . . . . . U . . . I . . . . . .
. . . . . . . . . . . . . . N . . . . N . . . . .
. . . . . . . . . . . . . . C . . . . . T D . . .
. . . . . . . . . . . . . . H . . . . . R E . . .
. . . . . . . . . . . . . . . . . . . A . . R . .
. . . . . . . . . . . . . . . . . . C . . . . . .
. . . . . . . . . . . . . . . . . . . . . Y . . .
. . . . . . . . . . . . . . . . H . . . R . . . .
. . . . . . . . . . . . . . . C . . . O . . . . .
. . . . . . . . . . . . . . N . . . M . . . . . .
. . . . P R O G R A M . . U . . . E . . . . . . .
. . . . . . . . . . . . P . . . M . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . .
```

COMPUTER BACKGROUND SEARCH 5.1.3

```
T X I N B F H X D H X H V K C O E B W L C Z J I S
H O I O R U S B W P M J J F O E Z I P N M V E U D
B I N A R Y C I K Q Y F O S U L O R C B X J D M Z
Y C R T Z M I X U E E E U H H I S M Z T W V J U H
B M N T C L P W P Z E C J M W J J H W Q S O S C F
G W Y S M O D K G R A G U Y W O J X F V F E W A V
M B N K M E F M L B X E M S K K I W P P K D K O A
I O R F H H K Y A S T P I K E B T Y K N X A G P Z
Q V T O U T O E R Y D H A K Y E P O M R A T M M R
J J K C S L A N B N E P N A P Z F R L G O A A R U
B E H I J Q L N V W I E F V U U J P I Y M I M P J
F B B K H R T D O I G M Y O N K N O S N N D S Y A
P E M B R Q E W L P Z O O K C R N W Z E T D P V B
Y N J I E P X W D V Q A O P H L R Y V L R E C Y B
G H L W K T V B H D Y D K Z I I X C L A A X R G J
X H Q G A K Z T E V G O O H N U E F C T D K Q V Q
L B K Y Y G M V F I A U J L I Y F   R W D Y W X Z
L S N L A H Z Y D A T O S T G D H V V N R P S X Y
S T B I G N Z W T S N I P E V C K L S O H N I T Y
W O O N V P R K V L A W Q J N C K B M A E W I L O
J X M O P R O G R A M W C U E N O E B N X A Z X J
J O J X P H W C S W D J P L Y N M D K Y I J U D Q
Y P B P D P Y D V X Z Y J S E P S L U N C I F K G
G E Q I U T P D O O S K F J W Y Q F K X B H M N U
F P U D M P A Q R Q J A L K A A R P H F R A I P Q
```

THERE ARE 10 WORDS HERE - CAN
YOU FIND THEM?

HERE ARE THE WORDS TO LOOK FOR:

ABACUS
BINARY
BYTE
CRT
DATA
KEYPUNCH
MEMORY
PRINTER
PROGRAM
PUNCH CARD

5.1.4
Reference No.

ACTIVITY TITLE: Parts Of Computer

OBJECTIVE: The student will define and spell terms related to background information on computers.

GRADE LEVELS: K-3 4-6 7-8 9-12

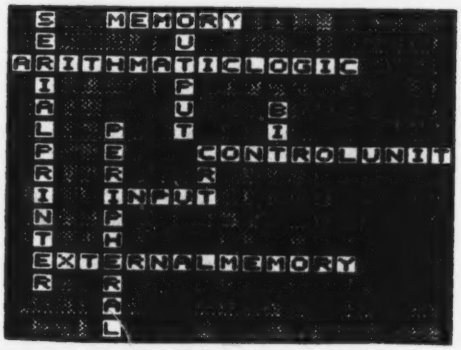
K-3	4-6	7-8	9-12
		*	*

DESCRIPTION: Students complete parts of computer crossword puzzle.

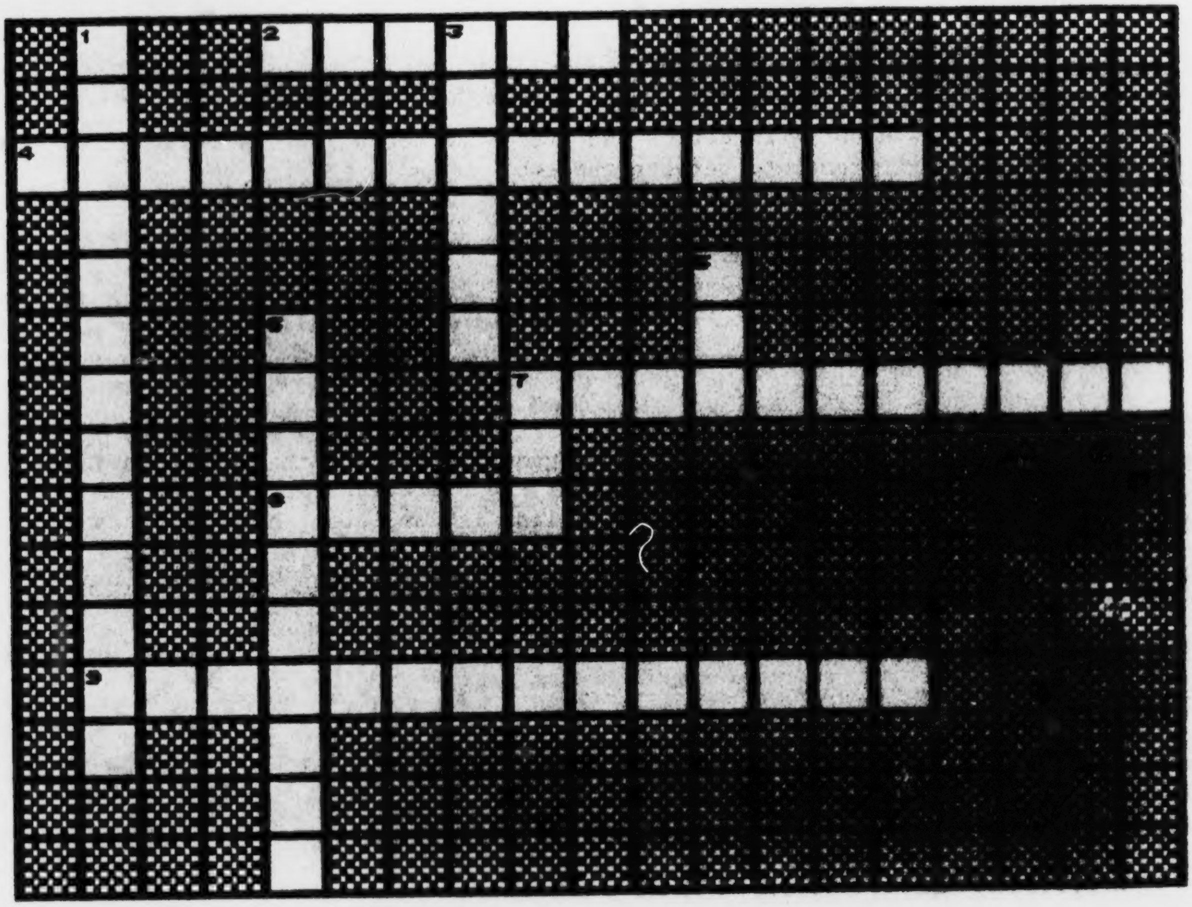
MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

ANSWERS: PARTS OF COMPUTER


SERIALPRINTER
MEMORY
OUTPUT
ARITHMATICLOGIC
BIT
CONTROLUNIT
CRT
PERIPHERAL
INPUT
EXTERNALMEMORY

PARTS OF COMPUTER



ACROSS CLUES

2. PART OF THE COMPUTER WHERE DATA IS STORED
4. PART OF THE COMPUTER THAT CALCULATES, THEM COMPARES AND CHECKS THE ANSWER
7. DIRECTS THE MOVEMENT OF THE INFORMATION WITHIN THE COMPUTER
8. MEANS OF GETTING INFORMATION INTO THE COMPUTER
9. INFORMATION STORED ON A DISK, FLOPPY DISK, MAGNETIC CARDS, ETC.

DOWN CLUES

1. TYPES LETTER BY LETTER, IN ORDER
3. MEANS OF GETTING AN ANSWER FROM THE COMPUTER
5. SMALLEST UNIT OF INFORMATION RECOGNIZED BY THE COMPUTER
6. AN EXTRA PIECE OF EQUIPMENT ON THE SIDE
7. CATHODE RAY TUBE

5.2.1
Reference No.

ACTIVITY TITLE: Hard Pac-Man Or Soft?

OBJECTIVE: The student will define and spell the terms "hardware" and "software" and differentiate between the two.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	

DESCRIPTION: Have students make a list of their favorite video games. When this is done, have them choose one game and picture the way it is in the arcades. They should then list all of the different parts of the game (i.e., monitor, case, etc.). When the list is completed, have students classify their list to "hardware in action" or "software in action" categories. Have a class discussion on the game and the "hardness" of their component parts.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES: If it is possible to bring in an arcade game, it would be helpful.

5.2.2
Reference No.

ACTIVITY TITLE: Hard Or Soft?

OBJECTIVE: The student will define and spell the terms "hardware" and "software" and differentiate between the two.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: Have students write an objective description of a microcomputer. This list of descriptions should include peripherals and disks or tapes with several programs.

After the list is complete, discuss the difference between hardware and software. Students then need to rewrite their list into the two categorier: hardware and software.

MATERIALS REQUIRED: Microcomputer with as many peripherals as possible
Disk or tape filled with programs

ADDITIONAL RESOURCES:

5.2.3
Reference No.

ACTIVITY TITLE: Softcut

OBJECTIVE: The student will define and spell the terms "hardware" and "software" and differentiate between the two.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*		

DESCRIPTION: In this activity, students search through magazines to find pictures which fit in either a "hardware" or "software" category. The class then makes a collage of the pictures for each category.

1. Prepare two large pieces of butcher paper with the words "software in a action" written on one and "hardware" on the other.

2. Display the definitions for "hardware" and "software" for all to see.

    Hardware: The physical components that make up a computer system.

    Software: Any computer programs or routines which enable the computer to process data and solve problems.

3. Pass out piles of computer magazines which have lots of pictures and print-outs of programs.

4. Instruct students to cut out pictures and glue them on to the appropriate piece of butcher paper.

5. Follow-up with a discussion of each of the terms and the pictures which students have chosen to illustrate them.

MATERIALS REQUIRED: Computer magazines for cut-up
Scissors
Glue

ADDITIONAL RESOURCES: Use this activity in conjunction with the activities under Goal 6.

5.3.1
Reference No.

ACTIVITY TITLE: Machine Match-Up

OBJECTIVE: The student will define and spell terms related to hardware.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: A matching exercise which matches names of pieces of equipment with a definition.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: Are You Computer Literate?

Answer key: ...Then, CONSIDER YOURSELF, COMPUTER LITERATE!

5.3.1

MACHINE MATCH-UP

Match the letters of the words in column B with their descriptions in column A. Not all words will be used. The, place each letter used in the appropriate space. Then, CONSIDER YOURSELF. . . .

-- -- -- -- -- -- -- --   -- -- -- -- -- -- -- -- !
10 6 7 1 9 4 5 3   2 11 4 5 3 8 4 5

___ 1. A TV-Like display screen

___ 2. Magnetic-type primary storage

___ 3. The instructions to a computer

___ 4. The information that comes out of a computer on devices like line printers and plotters.

___ 5. A computer that stores and processes information by using numbers.

___ 6. A system where many people use the computer at the same time.

___ 7. The part of a computer that does the mathematics of a problem.

___ 8. Primary and secondary storage

___ 9. A computer that works by using continuously varying quantities

___10. A keyboard device like a typewriter hooked up to a computer by wires.

___11. A machine used for punching holes in cards.

A. memory

B. magnetic disk

C. terminal

D. plotter

E. digital computer

F. magnetic drum

G. optical scanner

I. keypunch

J. statement

K. chip

L. core

M. arithmetic unit

N. paper-tape

O. time-sharing

P. cathode ray tube

Q. magnetic tape

R. program

S. control unit

T. output

U. analog computer

Used by Permission of dilithium Press.
From: Are You Computer Literate?, page 122.

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ACTIVITY TITLE: Hardware Term Search

OBJECTIVE: The student will define and spell terms related to hardware.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*		

DESCRIPTION: This word find reviews terms related to the component parts of a microcomputer.

MATERIALS REQUIRED: Student activity worksheet
See glossary

ADDITIONAL RESOURCES: Produced with MECC "Teachers Utilities Disk".

```
                  HARDWARE TERM SEARCH 5.3.2

. . . . . . . . . . . . . . . . . . . . . . . . .
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. . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . D . . . . . . . . . .   . . .
. . . . . . . . . . . I . . . . . . . . E . . . .
. . . . . . . . . . . . S . . . . . . T . . . . .
. . . . . . . . . . . . . K . . . . T . . . . . .
. . S . . . . . . . . . . .   . . E . . . . . . .
. . W . . . . . . . . . . . . D S . . . . . . . .
. . I . . . . . . . . . . . . S R . . R . . . . .
. . T . . . . . . . . . . . A . . I E . . . . . .
. . C . . . . . . . . . . C . . . T V . . . . . .
. . H . . . . . . . . . . . . . N C . E . . . . .
. . . . . . . . . . . . . . . I R . H . . . . . .
. . . . . . . . . . . . . . R O . T . I . . . . P
. . M O T H E R B O A R D P T . R . . . P . . I .
. . . . . . . . . . . . . I . C . . . . . . H . .
R A M   C H I P . . . . N K E Y B O A R D C . . .
. . . . . . . . . . . O . . . . . . . .   . . . .
. . . . . D . . U . M . . . . . . . . M . . . . .
. . . . . . I P . . . . . . . . . . O . . . . . .
. . . . . . C S . . . . . . . . . R . . . . . . .
. . . . . . . . K . . . . . . . . . . . . . . . .

IF YOU WISH, YOU MAY INSERT A DITTO
MASTER AT THIS TIME.  PRESS THE RETURN
KEY WHEN YOU WANT THE PUZZLE TO PRINT.
```

HARDWARE TERM SEARCH 5.3.2

```
L H F X O H O D N V M E R V L V M C J W D S Y Z F
P D B E M S U Y Z J X A Q S A Z X O P R X G L W O
D Q F B O O V I Q B R O J O C X J I V K P P Y M O
Z Y R N B G P S E N J N F A X K D Q Q W O O P Y X
R L I T O D X C K A S R U U H G C O R I T V T R R
J H W F O G X J D X D A N R S C X N W K O   A D U
W B Y I Q G J F M B F I N A K N H A C J E L J F W
V K Y Q Y I W Y I C V B S X Z X Z M E T T H J Z G
I R S C F U V X F W K P Z K B X Y Q T E I L D R O
J T S M D E R Q M J L K S O   W B E X D S E P L X
A Y W U R M U U Q N S A X R V D S A F B O O E Z Z
H R I X Z N K J H A G W J D U S R J L R D H E Z B
H F T J L K L X T C N D Y D A B T I E B P I U E Q
Z W C D X O M I M J T J S C H B U T V I A I S V W
F Z H H J O I N N P B S B C L D N C Q E X Q L C Q
Q W E C F H Q W C U R C G P A I R Y H L J X R W F
Y B E K E R V S L D I C F C R O H T O I R N I A P
Y C M O T H E R B O A R D P T U R S Q L P M R I S
T Y Z K L M S V J I U A H I Q C H B K Q K Z H N M
R A M   C H I P T X R I N K E Y B O A R D C H T K
P I S V D J G D B P V O E M V A Z L V I   J I H Y
D D S W P D I X U E M M Q L N Z P W Y M C U F C L
A W P Q K I I P Z P Y J N T G H A K O W I Z I V L
Q S U M T Q C S R F J E Z P W S E R X M V K M Y Y
C F U G I U R T K X K Y X K M I I X I H A V L C F
```

THERE ARE 13 WORDS HERE - CAN
YOU FIND THEM?

HERE ARE THE WORDS TO LOOK FOR:

CASSETTE
CPU
DISK
KEYBOARD
MOTHERBOARD
RAM CHIP
SWITCH
CHIP
CRT
DISK DRIVE
MONITOR
PRINTER
ROM CHIP

5.3.3
Reference No.

ACTIVITY TITLE: Computer Type Search

OBJECTIVE: The student will define and spell terms related to hardware.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: This word find requires students to find the names of various companies which produce computers.

MATERIALS REQUIRED: Word find worksheet

ADDITIONAL RESOURCES: Produced with MECC "Teachers Utilities Disk".

COMPUTER TYPE SEARCH 5.3.3 Primary

```
. . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . R . . . . . . . . . . . . . . . . . . .
. . . . . . A . . . . . . . . . . . . . . . . . .
. . . . . . . D . . . . . . . . . . . . . . . . .
. . . . . . . . I . . . . . . . . . . . . . . . .
. . . . . . C . . O . . . . . . . . . . . . . . .
A . . . . . O . . . . . . . . . I . . . . . . . .
T . . . . . M . . . . S . . . T . . . . . . . . .
A . . . . . M . . . . . H . . . . . . . R . . . .
R . . . . . O . . . . . . A . . . . . U E . . . .
I . . . . . D . . . . . . . C . . . O L . . . . F
. . . . . . O . . . . . . . . K . F P . . . . . R
. . . . . . R . . . . . . . . . . P . . . . . . A
. . . . C . E . . . . . . . . Y A . . . . . . . N
. . . I . . . . . . . . . . T I . . . . . . . . K
. . V . . . . . . . . . . X . . I . . . . . . . L
. . . . . . . . . . . . I . . . . M . . . . . . I
. . . . . . . . . . . S . . . . . . . . . . . . N
. . . T I M E X . . . . . . . . P E T . . . . . .
. . . . . . . . . . . . . . . . E P S O N . . . .
. . . . . . . . . . . . . . . . . . . . . . . . .
```

COMPUTER TYPE SEARCH 5.3.3 Primary

```
Z H H L E X O T Y R Z I H U T A L Y S R T W X O S
T S L Q T O Z U E V U E X V P D I R H Q Y N T R G
G H L G P L L S U N K C X J R O F U O N O N T U G
V J H Z L U I G E Z Y S S U G L U C L Q P H C K M
T C B H V Q O D J U J O T F E C T Q J I X X D O Z
P E O I Y R P V T G X Z I K I Q L H W Y J K M U S
G W R E T I A T W A R U A E I I C C B A B K U J K
W H C V N U S D C C O A U Y Y Q W P H L O K G S K
I O Y C O K B I I L J X V Y H K C Z Q N F V M I D
E Y G F K R C E W O A B V W K W I Q P V V D G A Q
A D G E H J O H E R   Q L A G A I Q S V O A M R O
T A X U B B M G B D X S L J P T S O M G S C O R Z
A C P O P P M T H X H D H S Q E B H S V R I C V R
R M I E U K O A T F G R E A U P I S R U E J C C R
I D E V A R D W T W B G V V C G A W O L G J Q Y F
S N U J O Z O Q K W G O Y T T K Y F P J A E X W R
K M Q R N A R D B R R V B K F J   P V H X F V E A
C E C R C P E B L Y A X T X Z Y A L V A Z U G S N
H H X I S G Z G E G T K Y W T I X U H L F O Y P K
C X V P F C Q Y K Y R T Q X M R I B Q X L V A L L
N H Y M O F D L Y X J G I J L X M M L A P W W G I
B H K G Y D L K B S U S R M S I L G P I Y H O U N
O F O T I M E X W V I D K Y S D P E T Z Z H F W N
J F M I X P D U S T A R C O T I E P S O N K X A Y
T Y Y F R P J I T Y Q Z O I T L G N X R A J O D I
```

THERE ARE 12 WORDS HERE - CAN
YOU FIND THEM?

HERE ARE THE WORDS TO LOOK FOR:

APPLE
COMMODORE
FRANKLIN
PET
SIXTY FOUR
TIMEX

ATARI
EPSON
IIe
RADIO SHACK
TI
VIC

<u>5.3.4</u>
Reference No.

ACTIVITY TITLE: Computer Brand Search

OBJECTIVE: The student will define and spell terms related to hardware.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: This word find requires students to find the names of various companies which produce computers.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: See related activity 3.7.1.

COMPUTER BRAND SEARCH 5.3.4

```
. . . . . . . . . . . . . . H E W L E T T   P A C K A R D . . .
. . . . . . . . . . . . . . . . A . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . T . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . I . N . . . . . . . . . . . . . . .
. X E R O X . . . . . . . G . I . . . . . . . . . . . . . . . .
. . . . . . I B M . . . I . L . . . . . . . . . . . . . . . . .
. . . . . . . . . . . D . K . . . . . . . . E . . . . . . . . .
. . . . . . . . . . . . N . . . . . . . . R . E P S O N . . . .
. . . . . . . . . . . A . . . . . . . . O . . . . . E . . . . .
. . . . . . . . . . R . . . . . . . . D . . . . . L . . . . . .
. . . . . . . . . F . . . . . . . . O . . . . . P . . . . . . .
. . . . . . . . . . . . . . . . . M . . . . . P . . . . . . . .
. . . . . . . . . . . . . . . . M . . . . . A . . . . . . . . .
. . . . . . . . . . . . . . . O . . . . . . . . . . . . . . . .
. . . . . . . . . . . X . . C . . . . . . . . . . . . . . . . .
. . . . . . . . . . E . . . . . . . . . . G . . . . . . . . . .
. . . . . . . . . M . . . . . . . . . . N . . . . . . . . . . .
. . . . . . . . I O . . K . . . . . . A . . . . . . . . . . . .
. . . . . . . T . . H C . . . . . . W . . . . T . . . . . . . .
. . . . . . . . . . A I . . . . . . . . . . . . I . . . . . . .
. . . . . . . . . H R . O . . . . . . . . . . . . . . . . . . .
. . . . . . . . S I . . .   . . . . . . . . . . . . . . . . . .
. . . . . . .   A . . . . . S . . . . . . . . . . . . . . . . .
. . . . . . O L I . . . . . . C . . . . . . . . . . . . . . . .
. . . . . I C R . . . . . . . . I . . . . . . . . . . . . . . .
. . . . D N A . . E . . . . . . . E . . . . . . . . . . . . . .
. . . A I T . . N . . . . . . . . . N . . . . . . . . . . . . .
. . R S A . . R . . . . . . . . . . . T . . . . . . . . . . . .
. . . . . . O . . . . . . . . . . . . . I . . . . . . . . . . .
. . . . . B . . . . . . . . . . . . . . . F . . . . . . . . . .
. . . . S . . . . . . . . . . . . . . . . . I . . . . . . . . .
. . . O . . . . . . . . . . . . . . . . . . . C . . . . . . . .
```

COMPUTER BRAND SEARCH 5.3.4

```
L F T J K J G D Q Y M M T R H E W L E T T   P A C K A R D E U E
Q J V C N U M X R X Q X I O X F A U F L H J Z Q M G Y V G S N F
R U K H V C X F X N Q K A L I T A P G O F M F S E B W R K Z R T
X U L J G E M Q U Y P O I P I B N K S N P W J U I B G M M F V V
D X E R O X X C Y U Y K O G G I K G D U M G X E M M J S I H U T
B E F O E A I B M J S L I X L K Q U T O P Y F T L J H H T M C F
U Y H R I C N B E I F D H K A P A C S T Z G E X R P I P U L F P
P Q Z Z S A K T K G I G N F U I T H W I H R T E P S O N A Q I M
S Y P Q C E R K B S R A W T U U O L D R O C U I H E E Z I I A Y
V M D U Q P V C T D R F Q Z R G I K Q D Q B M D Y L I U S O Z T
W W S J Y Q Z H W F M Q B O Y V B A O W C C Y T P N K T I T E J
T Y F V U F Y Y Z D Z I H Y I M M M W U P F F P S C O O J A K V
A R Q R P I E F N U S X T Q B H M E B V B F A M G B F J X V I K
X U S Q J W S V D O W E V M G O P A A U A B X Q G W C A A G V H
S V W P G K X B K M S X D D C F D W D N V M R G Z X X S B L J C
J P D D N X X V X I E J D D T W E L T F M G E D J X H U T L F C
W O F B F V E K M M K D T P G J B L C W N C J I K K I L E B H W
G W P N X G K U I O M J K E G I G N V A F N Z E W K B T X X C L
M D E H U H A T N W H C N E F P X R W W L W G T P M I W T W S L
G H Z K P R X Y X T A I R J H G Y K X P O T R E I M P H J V M K
H B Q B T S U A Y H R B O Y P A Z N W T C H G D M E N H J C J W
Z G Z O Q F T I S I A L F   C V H N T C I N B S H Z I Q O F Z C
Y Y H L O V R   A E O R T U S F I W B F L Q K D F V V K A J O R
Z B S A A A O L I A E B A L B C R G I Y S P K A H V S T O H I G
M V Z F H I C R U Z W Z T P S H I M U V B G S R A R S N A E F X
L I T Q D N A B S E L M Z X S K X E T C G Q V A S I Y Y D Q S A
N W O A I T D H N A U K K M G X Y S N C O L L N M Q D Z N Z S C
M P R S A Z B R M L V L X D O L H S R T Y I Z B Q A T Y V M T R
O A E N D T O Q L Y S D B W T X W U G E I I W M Q L B J J Y M M
G F J A V B P B W U Z A S I A W E B U N Y F M F V J S O N V L S
T P W Y S I O L H L N I X U N H H Z J N S M I A P M M G P K K T
Y R H O P C V T F V J M O S U J W T J M S M K C F L B P E L O W
```

THERE ARE 16 WORDS HERE - CAN
YOU FIND THEM?

HERE ARE THE WORDS TO LOOK FOR:

APPLE
COMMODORE
EPSON
HEWLETT PACKARD
OHIO SCIENTIFIC
RADIO SHACK
TI
WANG

ATARI
DIGITAL
FRANKLIN
IBM
OSBORNE
SINCLAIR
TIMEX
XEROX

5.4.1
Reference No.

ACTIVITY TITLE: How Computers Work

OBJECTIVE: The student will define and spell terms related to the function of a computer such as memory, input, output, arithmetic unit, control and unit, and C.P.U.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*		

DESCRIPTION: After the teacher reviews how a computer functions, the students will fill in matching sheet.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: See computer literacy glossary, 5.0.2.

See related activity 6.2.1.

Answer key:

1. c
2. h
3. g
4. b
5. a
6. i
7. j
9. k
9. l
10. d
11. e
12. f

HOW A COMPUTER WORKS
MATCHING SHEET

1._____ Conducts the traffic in and out of the computer.

2._____ Where information is stored.

3._____ Does math operations in the computer.

4._____ Information that has been worked on by the computer then goes to a printer or CRT.

5._____ Information that will be put into the computer.

6._____ Made up of control and arithmetic unit.

7._____ Person who operates the computer.

8._____ Temporary computer memory which is erased when the power is turned off.

9._____ Permanent computer memory.

10._____ This device is used to temporarily view computer OUTPUT.

11._____ Used as both an INPUT and OUTPUT device. Provides permanent storage of information.

12._____ The INPUT device used to type information into the computer.

A. input
B. output
C. control
D. CRT
E. disk drive
F. keyboard
G. arithmetic unit
H. memory
I. CPU
J. user
K. RAM
L. ROM

5.4.2
Reference No.

ACTIVITY TITLE: How Computers Function

OBJECTIVE: The student will define and spell terms related to the function of a computer such as memory, input, output, arithmetic unit, control unit, and CPU.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: After reading definitions on worksheet, students will write in the correct terms.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: See computer literacy glossary, 5.0.2.

See related activity 6.2.1.

Answer key:

Part I	Part II	Part III
1. output	1. output	A. 4
2. arithmetic unit	2. memory	B. 2 or 5
3. memory	3. arithmetic & logic	C. 3 or 2
4. input	4. input	D. 6 or 3
5. CPU	5. memory	E. 1 or 6
6. control unit	6. arithmetic & logic	F. 5 or 1

5.4.2

HOW COMPUTERS FUNCTIONS

Part I. Fill in the statements from the answers below.

1.__________ Processed information. It is the answer, solution, or end result of a problem that has been solved by a computer.

2.__________ The part of the central processing unit of a computer that performs all arithmetic operations.

3.__________ The part of the computer that stores programs and data.

4.__________ Information or data of any kind that is entered into computer.

5.__________ Consists of the control unit and arithmetic unit. It is the heart of the computer.

6.__________ Oversees the movement of data between different parts of computer.

Words: memory
arithmetic unit
control unit
output
CPU
input

Part II. Pretend you are MAC, a Magnificent Accounting Computer, with all five of the common functional parts of the computer. Your task is to give the grade point average of Suzie Z. Smart, a student. After each statement, identify which part of the computer is used: INPUT, ARITHMETIC AND LOGIC UNIT, MEMORY, OUTPUT, OR CONTROL UNIT.

1. The grade point average is printed. ____________________

2. You, the computer, know that the letter grades have a number value: A=4, B=3, C=2, D=1. ____________________

3. The grades are added together. ____________________

4. You are told that Suzie got an A in 1st period, B for 2nd, C for 3rd, A for 4th, B for 5th and C for 6th. ____________________

5. The information of Suzie's grades are stored. ____________________

6. The sum of the grades is divided. ____________________

Part III. Put the above list of activities into the order in which they would occur.

____A. ____B.

____C. ____D.

____E. ____F.

5.4.3
Reference No.

ACTIVITY TITLE: Function Find

OBJECTIVE: The student will define and spell terms related to the function of the computer.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: This word find requires students to identify words related to the functioning of a computer.

MATERIALS REQUIRED: Word find worksheet

ADDITIONAL RESOURCES:

COMPUTER FUNCTION SEARCH 5.4.3

```
. . . . . . . D . . . . . . . . . . . . . . . . .
. . . . . . . I . . . . . . . I . . . . . . . . .
. . . . . . . S . A . . . . . N . . . . . . . . .
. . . . . . . K . . R . . . . P . . . . . . . . .
. C . . . . . . . . . I . . . U . . . . . . . . .
. . O S T O R A G E . . T . . T . . . . . . . . .
. . . N . . . . . . . . . H . . . . . . . . . . .
. . . . T . . . . . . . . . M E . . . . . . . . .
. . . . . R . . . . . . . . C E . . . . . . . . .
. . . . . . O . . . . . . A . . T . . . . . . . .
. . . . . . . L . . . . F . . . . I . . . . . . .
. . . . . . . .   . . R . . . . . . C . . . . . .
. . . . . . . . . U E . . . . . L . .   . . R . .
. . . . . . . . . T N . . . . . . O . . U . A C .
. . . . . . . . N . . I O U T P U T G . . N M R .
. . . . . . . I R O M . T . . . . . . I . . I T .
M . . . . . . . . . . . . . . . . . . . C . . T .
E . . . . . . . . . . . . C . . . . . . . . . U .
M . . . . . . . . . . . . . O . . . . . . . P . .
O . . . . . . . . . . . . . . M . . . . . C . . .
R . . . . . . . . . . . . . . . P . . . . . . . .
Y . . . . . . . . . . . . . . . . U . . . . . . .
. . . . . . . . . . . . . . . . . . T . . . . . .
. . . . . . . . . . . . . . . . . . . E . . . . .
. . . . . . . . . . . . . . . . . . . . R . . . .
```

COMPUTER FUNCTION SEARCH 5.4.3

```
C I T C E L Z D F Q I H T Q X W Y Y N G Q K X M L
T R P I N J X I V H V Q R N M I V W L U A Q K O H
T U I S O N Q S P A Q R Y X S N H S Z M M C O M X
B W R V G D O K Y P R R G S J P Z N J I Q X Z J I
E C H M P L V F J W E I J Q U U S T N E O A E B C
W X O S T O R A G E P B T Z F T Y T V W E U S M I
V K G N D H H F G Q M B I H A T S M J L T T X Y T
F R T W T O C I G I A B U Q M E I P L V S N B C L
Y U E R V R T B S I R X W O C E X Y C K E R C E Z
E N J S E K O X H S O X Z A I P T M Z F D Z Q R Z
I P N C L G W L D N T X F N S N D I L E Z D X J B
O L R B I Z A F   L A R F U M F Q M C W M A J S W
M C F M S H C V Y U E J H O G F L C Z   H G R U E
R M F Y P E D M M T N U W G X Q Y O G N U X A C G
P T V H N D A R N Y B I O U T P U T G V K N M R Q
X L Q N A Y M I R O M C T C U J E P A I Y X I T L
M P W G Z D B J J G C N E I E V T R J L C U N T V
E G C H Z V O K M I C U Y C L D N X U O V F V U G
M Z Y N U C L L A Q T N R Y O G R V W E R W P L Z
O G U H A U X M W E M E M O L M T A E U J C C K X
R J S Z S F Z M M R D O A Q A M P X H J X B T G N
Y S L H J R F H T U N I K I Z A R U M R W W H U D
C P U W V O S J J U C T I D N S Y Q T K U W Q W X
X G O V H I L X G M T U J O K J V E F E Y H J L F
M C F I W E H F M E G C W F T U L V V Q R Q J K I
```

THERE ARE 14 WORDS HERE - CAN
YOU FIND THEM?

HERE ARE THE WORDS TO LOOK FOR:

ARITHMETIC UNIT
CONTROL UNIT
CRT
INPUT
LOGIC
OUTPUT
ROM
COMPUTER
CPU
DISK
INTERFACE
MEMORY
RAM
STORAGE

ACTIVITY TITLE: Language Find

OBJECTIVE: The student will define and spell terms related to program language.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: This word find requires students to identify the names of various programming languages. A brief background sheet is included for either instructors or students.

MATERIALS REQUIRED: Word find worksheets
Language background sheet

ADDITIONAL RESOURCES:

```
                LANGUAGE FIND 5.5.1

. . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . .
. . . . L . . . . . . . . . . . . . . .
. . . O . P . . . . . . . . . . . . . .
F . B . . A . . . . . . . . . . . . . .
. O . . . S . . . . . A P P L E S O F T
C . R . . C . . . . . . . . . . . . . .
. . . T . A . . . . . . . . . . . . . .
. . . . R L . . . . . . . . . . . . . .
. . . . . A . . . . . . . . . R . . . .
. . . . . . N . . . . . . T E . . . . .
. . . . . . . . . . . . O G R . . . . .
L . . . . . . . . . . L E . P . . . . C
O . . . . . . . . . I T . . G . . . I .
G . . . . . . . . P N . . . . . . S . .
O . . . . . . . . I . . . . . . A . . .
. . . . . . . . . . . . . . . B . . . .
. . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . .

IF YOU WISH, YOU MAY INSERT A DITTO
MASTER AT THIS TIME.  PRESS THE RETURN
KEY WHEN YOU WANT THE PUZZLE TO PRINT.
```

5.5.1

LANGUAGE BACKGROUND SHEET

A computer language is a series of instructions understood by the computer so that information may be conveyed between people and the machine.

Applesoft - A version of BASIC used within Apple Computers.

BASIC - Beginner's All-Purpose Symbolic Instruction Code.

COBOL - Common Business Oriented Language.

FORTRAN - A language that uses algebraic symbols. Fortran stands for Formula Translator.

Integer - A version of BASIC used with Apple Computers.

LOGO - A computer language designed for very young children up to college aged users. The basic ideas of programming are taught through turtle graphics, and this language will also handle numbers, words, and lists.

PASCAL - A general purpose language which is rapidly gaining a wide acceptance. Named after the mathematician Blaise Pascal.

RPG - Report Generation used by IBM Computers.

PILOT - An authoring language that enables the user to write programs without a lot of background in program.

LANGUAGE FIND

```
A R S N A E F X L I T Q B S L M Z X S K
X T C G Q V A S I Y Y D Q S A N W O D H
A U K K M G X Y S C O L L N M Q D Z N Z
S C M P L Z B M L V L X D O L H S R Y I
Z B Q O A P T Y V M T R O A E N D T Q L
F Y B S D A B W T X W U G E I W M Q L B
J O J Y M S M G F J A A P P L E S O F T
C V R P B C W U Z A S I A W E B U N Y M
F V J T S A O N V L S T P W Y I O L H L
N I X U R L N H H Z J N S M A P M M G P
K K T Y R A H P C V T F V J M R O S U J
W T J M S M N K F L B P E T E L O W V S
I J W X T U D M P H O J O G R V Z E X U
L Q N H M A Q D X U E L E E P X E D R C
O V P G D X S Q Z C I T T Y G X R L I Z
G H H L E X O T Y P N R Z I H U T S A L
O Y S R T W X O S I T S L Q T O A Z U E
V U E X V P D I R H Q Y N T R B G G H L
G P L L S U N K C X J R O F U O N O N T
U G V J H Z L U I G E Z Y S S U G L U C
```

THERE ARE 9 WORDS HERE - CAN YOU FIND THEM?

HERE ARE THE WORDS TO LOOK FOR:

APPLESOFT
BASIC
COBOL
FORTRAN
INTEGER
LOGO
PASCAL
PILOT
RPG

5.6.1
Reference No.

ACTIVITY TITLE: Computer Lingo

OBJECTIVE: The student will define and spell terms related to programming and operation such as run, load, save, boot, bug, debug, and data base.

GRADE LEVELS:	K-3	4-6	7-8	9-12
				*

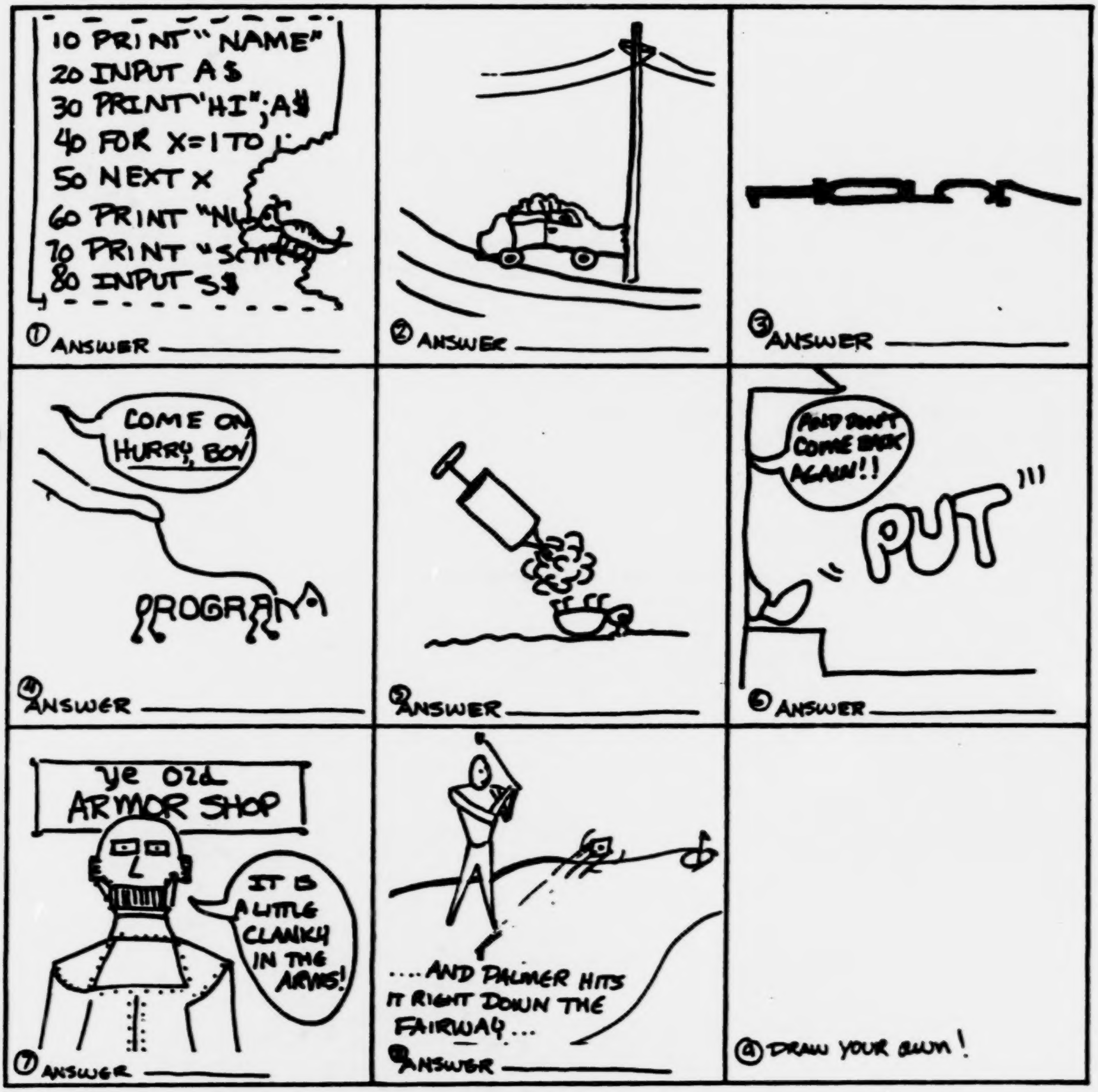
DESCRIPTION: The student will identify a computer term from the pictures on the activity sheet.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

Computer Lingo

From Allan Dunn, Oregon City School District #62.


10 PRINT "NAME"
20 INPUT A$
30 PRINT "HI";A$
40 FOR X=1 TO
50 NEXT X
60 PRINT "N
70 PRINT "S
80 INPUT S$
① ANSWER
② ANSWER
③ ANSWER
COME ON HURRY, BOY
PROGRAM
④ ANSWER
⑤ ANSWER
AND DON'T COME BACK AGAIN!!
"PUT"
⑥ ANSWER
ye old ARMOR SHOP
IT IS A LITTLE CLANKY IN THE ARMS!
⑦ ANSWER
....AND PALMER HITS IT RIGHT DOWN THE FAIRWAY...
⑧ ANSWER
⑨ DRAW YOUR OWN!

Hints: OUTPUT, SOFTWARE, HARDWARE, BUG, CRASH, RUN, CATALOG, DEBUG, INPUT, DISK DRIVE, COMPUTER, LINE NUMBER, PRINTER, PROGRAM, GRAPHICS

BEST COPY AVAILABLE

5.6.2
Reference No.

ACTIVITY TITLE: Beginning Program Find

OBJECTIVE: The student will define and spell terms related to programming and operation of the computer.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: This word find requires students to identify various terms related to programming a microcomputer. Terms related to graphics are Apple specific.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

```
                BEGINNING PROGRAM FIND 5.6.2

. . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . T G . . . . . . . H L I N . . . . .
. T . . . . S . . O . . D E L . . . . . . . . . .
. . E . . I . . . . T . . . . . . . . . . N . . .
. . . X L P R I N T . O . . . . . . . . . E . . .
. R . . T . . E . . . . . . . . . . . . . X . . .
. . E . . . . . T . . . . . . . . T . . E T . . .
. . . M . . C . . U . . . S . . O . . M . . . . .
. . . . . . . O . . R . . . P L . . O . . . . . .
. . . . . . . . L S . N . . P E . H . . . N E W .
. . . . . . . . . O H . . I N V E R S E . . . . .
. . . T . . . . . . R I . . . . I D . . . . . . .
. . . . H . . . . . . . F . . . N . . . . . . . .
. . . . . E . . . . . . . I . . I . . . . . . . .
. . . . . . N . . . . . . . . N T . . . . . . . .
. . . . . . . . . . . . . . I . . . . . . . . . .
. . . . . . . . . . . . . L . D . . . . . . . . .
. . . . . . . . . . . . V . N . . . . . . . . . .
. . . . . . . . . . . . P E . . . N O R M A L F F
. . . . . . . . . . . O . . . . . . . . . . . L O
. . . . . . . . . . O . . . . . . . . . . . . A R
. . . . . . . . . L . . . . . . . . . . . . . S .
. . . . . . . . . . . . . . . . . . . . . . . H .
. . . . . . . . . . F G . . . . . . . . . . . . .
. . . . . . . . . I . R . . . . . . . . . . . . .
```

BEGINNING PROGRAM FIND 5.6.2

```
W J O L Z I Y M C V C D T O K M N H I P Q V F Q B
D O F Q A W Y T G B Y G V Q D I H L I N J G H Q B
E T H C A G S S H O L N D E L X O U L Y T D Y Y Z
L R E G H I B Z F Z T Q K E P M L T Q T L N Z M Z
G K W X L P R I N T D O J T O V N U E H W E Z O L
D R I R T I A E P Z F I N H O P I O V T L X J H J
W I E H G T Z M T B Y F F B X I S T R V E T H R C
H L F M A A C V F U X T Z S I T O C B M I J J N I
L U P O P F B O X D R F V W P L P M O H N A R S T
X I J N V J U G L S Z N Z X P E W H P N N N E W R
I I G R Q S D X V U H V U I N V E R S E B B J E Z
I P J T Z E S U H C R I X Z R G I D R N E C C M A
L V X W H R F V X H B M F A K M N H Z Z V G A X H
B O N I C E O K W F G M Q T Q G I G V D O V I H W
B G E F A D N O O J F R X C I N T K T B U D C X E
U L X G T D K I T H E T T D I J R Y J F G B F G P
T D J M R F Y T P I F Q Z L S D Z J Y H J I H M I
O C M I C X U G Q W I V V B N N U U D K P H U X C
T I U W Z G N K A Y F B P E X A Q N U R M H L F F
Z H I D N Z I T X I Y O G P N D N J D H D G L L O
B I Z K H N Z T V K O R F X P W N L N O E T Z H R
B O L J Q Z P G X L J B C T T L M W G Y E P O S E
C T D F N H S W Z D K Q I V T T H R J R F K U H G
B X V P G B Y E J U F G H A R Z B I Q N C U W T Y
D A E H K Q S S B I U R K B B V S Z B C M N Y D H
```

THERE ARE 26 WORDS HERE - CAN YOU FIND THEM?

HERE ARE THE WORDS TO LOOK FOR:

COLOR
END
FOR
GR
HOME
INIT
LIST
NEW
NORMAL
PRINT
RETURN
SPEED
THEN
DEL
FLASH
GOTO
HLIN
IF
INVERSE
LOOP
NEXT
PLOT
REM
SHIFT
TEXT
VLIN

5.6.3
Reference No.

ACTIVITY TITLE: Operate On Command Crossword

OBJECTIVE: The student will define and spell terms related to the function of the computer.

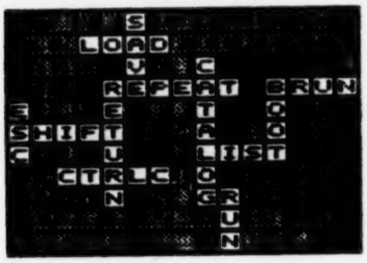
GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: This crossword puzzle requires students to identify words related to the functioning of a computer.

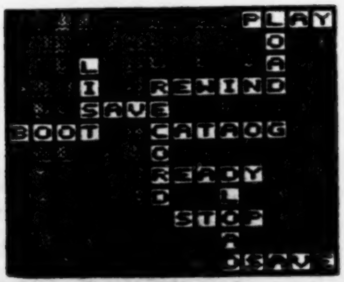
MATERIALS REQUIRED: Student activity sheet

ADDITIONAL RESOURCES: Crossword magic software

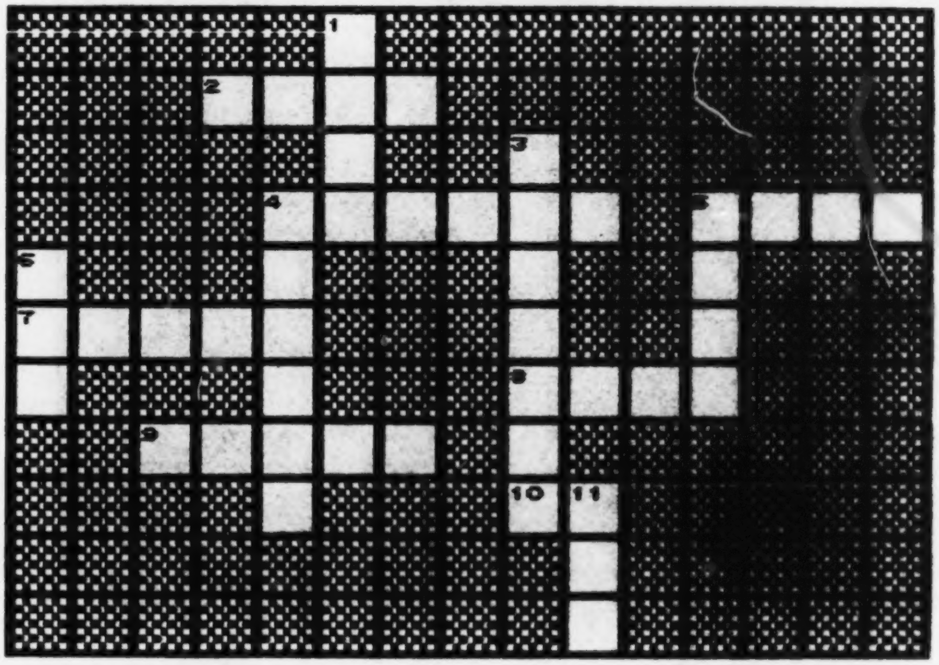
ANSWERS: OPERATION COMMANDS


S
LOAD
V C
REPEAT BRUN
E E T O
SHIFT A O
C U LIST
CTRLC O
N GR
U
N

ANSWERS: OPER. COMMANDS--PET


PLAY
O
L A
I REWIND
SAVE
BOOT CATAOG
O
READY
D L
STOP
A
DSAVE

OPERATION COMMANDS



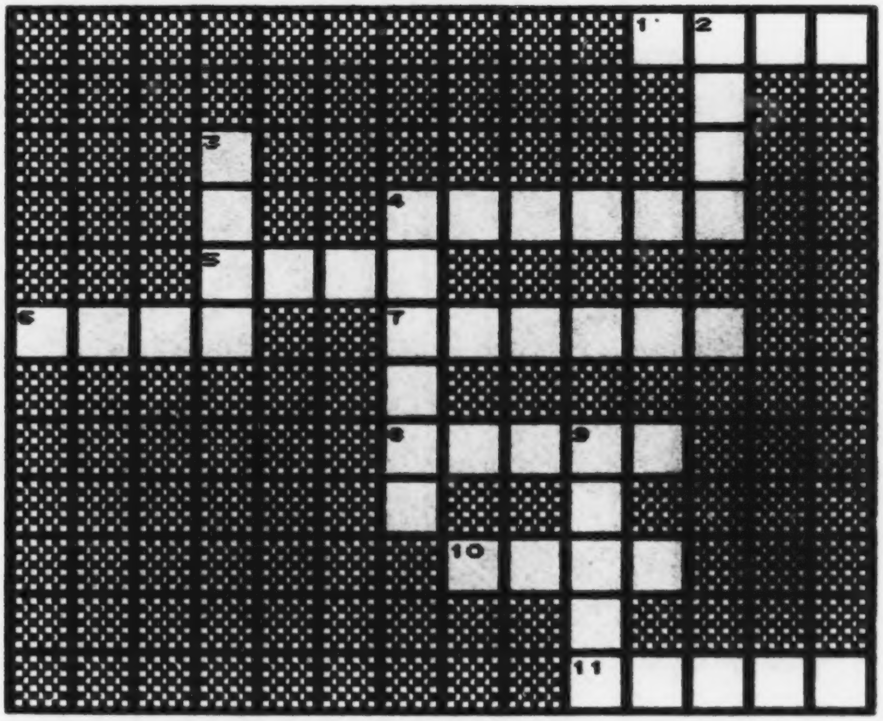
ACROSS CLUES

2. PUTS A PARTICULAR PROGRAM INTO RAM MEMORY (TEMPORARY MEMORY)
4. KEY USED WITH ANOTHER KEY TO DUPLICATE MANY TIMES
5. RUNS A BINARY PROGRAM
7. THE SERVICE KEY WHICH ENABLES YOU TO GET THE TOP CHARACTER ON A KEY
8. TO VIEW THE STEPS FOR A SPECIFIC PROGRAM, TYPE -------.
9. TO STOP EXECUTION OF A PROGRAM
10. PUTS COMPUTER IN LOW RESOLUTION GRAPHICS

DOWN CLUES

1. STORES PROGRAM
3. A LISTING OF THE PROGRAMS STORED ON THE DISK
4. TO INDICATE THE END OF A PIECE OF INPUT
5. WHEN YOU START A DISK FROM THE BEGINNING BY EITHER TURNING ON THE MACHINE, PR#6, OR IN#6.
6. KEY USED TO PUT COMPUTER IN EDIT MODE
11. BEGINS OPERATION OF A PROGRAM

OPER. COMMANDS--PET



ACROSS CLUES

1. ACTIVATES THE TAPE RECORDER
4. A BUTTON PRESSED ON THE CASSETTE PLAYER THAT INSTRUCTS IT TO GO BACK TO THE BEGINNING OF TAPE
5. STORES PROGRAM
6. WHEN YOU START A DISK FROM THE BEGINNING BY EITHER TURNING ON THE MACHINE, PR#6, OR IN#6.
7. A LISTING OF THE PROGRAMS ON THE DISK
8. SIGNAL THAT INDICATES THE OPERATOR CAN BEGIN
10. BREAKS EXECUTION OF A PROGRAM
11. STORES PROGRAM ON DISK

DOWN CLUES

2. PUTS A PARTICULAR PROGRAM INTO RAM MEMORY (TEMPORARY MEMORY)
3. TO VIEW THE STEPS FOR A SPECIFIC PROGRAM, TYPE _______.
4. A BUTTON PRESSED ON THE CASSETTE PLAYER TO READY IT FOR SAVING A PROGRAM.
9. TO RETRIEVE A PROGRAM FROM A DISK

5.6.4
Reference No.

ACTIVITY TITLE: Advanced Program Find

OBJECTIVE: The student will define and spell terms related to programming and operation of the computer.

GRADE LEVELS:	K-3	4-6	7-8	9-12
				*

DESCRIPTION: This word find requires students to identify various terms related to programming a microcomputer. Terms related to graphics are Apple specific.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

ADVANCED PROGRAM FIND 5.6.4

```
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . . . . . . . . . . . . . . . . R . . . .
. . . . R G . . . . . . . . . . I N P U T . . . . . E . . . . .
. . . N . R . . . . . . N I L H . . . . . . . . . M . . . . . .
. . D . N E H T L E D I M . . . T . . . . . . . . . . . . . . .
. . . . . . . . . . C I R E M U N R . . . . . . . . . 7 . . . .
. . . . . . . . . . . . . . . . . . A . . . . . . . . . I . . .
. . . . . . . N I L V . . . . . . . . C . . . . . . . . . N . .
. . . . . . D A T A . . . . E . T . . . E . D . . . . . . . I T
. . N N . . . $ D I M . . L . N . . . . . H . . . . . . . . . N
C . . E . . R U L O C H A . I . . . . . U . . . . . S . . . . I
S . . W L . . . . . . C . . . . . . E L . . . . . T R U F . . R
E . . . . E . . . . S . . . . . . . B S . . . . O . . . . . . P
. . . . V . . . N . . . . . . . . . . . R . . P . . . . . . . .
. . . A . . . . R L . . . . . . . . . . . E . . . . . . . . . .
. . S . . . . . U . A . . . . . . . . . . . V . . . . . . . . .
. B . . . . . . T D . M . . T . . . . . . . . N . . . . . . . .
. . . . . . . . E C R . R . . S . . . . . . . . I . S P E E D .
. . . . T E X T R . H A B O . . I . C . B H . E M O H . . . . .
. . . . . . . . . . . R W A N . . L S . G H . . . . . $ . . . .
. . . . . . . . . . . C $ . T . . . H R . . T D N E . . T . . .
. . . . T . . . . . . I . . . H . . 2 . . T . . . . . . L F . .
T O R O . . . . . D . R . . . . . . . . . X . . W . . R . $ E .
. . L . N O I T A T N E M U C O D . . . . E . . A . T . . T . L
. P . . . . . E . . . M P . . . . . . . . N . . R C . . . H . .
H . . . . . R T O L P U E . . . . O T O G . . . D . . . C G I r
. . . . . . . . . . . N T L . . . . . . . . . . X . F U . I . .
. B . . . K . S . . . A S H . S V T A B . . . . . L L . . R . .
. . U . . E . P T . H . V . H . . . . . . . . . A O E . . . . .
. . . S . E . O . R . P . . I . G . . . . . . . B K . K . . . .
. . . . O P . U . . $ L R W H F E . . . . . . H . . . U . . . .
. . . . . B . L . . . H . . 7 K A H C W U L F . . . . . . P . .
```

ADVANCED PROGRAM FIND 5.6.4

```
Q L M B F I Q J N V Y S Q X S Q T I N W U P Z F B N N C K P X Z
K C N X M J N E K Q U C L V R R P A D S C B B O T M T K Q S E U
K S F N R G Z M L S G Q U Q T Y I N P U T M T Z U T E A X Q D F
H D I N A R J Q C I A B N I L H V S K D K Y U F Z M M L B K V U
J C D L N E H T L E D I M K T U T J I S V Q F X D B S B T M J Z
I V J P V S D D O D C I R E M U N R P I F Y D K V R B T U F B W
Q K V C J Z X G A D Y Q K U A H U M H B K W J W T E Z S I D C O
H Q K P K Z G N I L V Z G L P J C H F C Z K K B L P E U D N G E
E C I Y Q D D A T A Q Q S R E O T V H X E H D O H H L R X U I T
Q Y N N M B S $ D I M K M L P N C Q T V V A F A W C L E A X Z N
C W Y E G J R U L O C H A U I C B D R D O P B O I T S A F H P I
S Z Z W L S T C W C J C C S N Z M X E L H H J Y U T R O F I F K
E L Q R A E P H A A S C R S A N F E B S S J T V O D E M C W L P
T F O H V D E C N E V M U X I S Q E B R R C J P W U J E L U J E
K N C A H X W X R L K K M I K V O P B F S E U O N A K W X I N H
K G S L R R T E U O A M W L K C T D V L C A V D F L J P D M U E
G B A T V V J H T D D M Q B T P Z S D S Q S X N S P M U B Y J P
B O Y J P F W M E C R D R N S S C V B N U H A H I N S P E E D P
R F K X T E X T R L H H B O N Q I V C T S H J E M O H T H G M C
D J W X H A D D A I Z R W A N Z B L S Z G A F S X Y N $ W H F N
M U I R V E C J K N H C $ T T O G Y H R O M T O N E D U T R M B
B M N D T D O T C N W I F O Y H O U 2 B O T N M J I R U L F N X
T O R O T L C X P D C R Z O I F D G X F M X W I W Z N R J $ E G
B Y L V N O I T A T N E M U C O D R H N K E A N A U T J M T W L
V P M O Q Y O E H V Q M P I M D O I P J Z N F S R C K F U H F J
H S O U J G R T O L P U E S R G P O T U G X Q R D I E Z C G I F
W C G M T M Z Q E U B N T L Z B L C G J J K I K X A F O G I K K
Z B N N U K X S S X W A S H G S V T H B W J K Q F L L L N K E V
I L U J I E W P T J L H K V M H U T U C E G R X H U E B K H H N
S A J S B E M U S R L P E H I I U G G M F H F S K Y K K K B J M
O D P I U P C O T N $ L R G H F E M G H T M H O G X R Z U H S W
N T L M W G F L S L N H G A C T K A H C W O L F P X T Z C P Z K
```

THERE ARE 66 WORDS HERE - CAN YOU FIND THEM?

HERE ARE THE WORDS TO LOOK FOR:

ALPHANUMERIC
BLOAD
CHR$
CTRL
DEL
DOCUMENTATION
END
FLASH
FOR
GOSUB
GR
HGR
HLIN
HPLOT
IF
INPUT
INVERSE
LEN

ASC
BSAVE
COLOR
DATA
DIM
DRAW
ESC
FLOWCHART
GET
GOTO
HCOLOR
HGR2
HOME
HTAB
INIT
INT
LEFT$
LIST

LOOP
NEW
NORMAL
PEEK
POKE
READ
RETURN
RND
SCALE
SPEED
STOP
TAB
THEN
VAL
VTAB

MID$
NEXT
NUMERIC
PLOT
PRINT
REM
RIGHT$
ROT
SHIFT
STEP
STR$
TEXT
TRACE
VLIN
XDRAW

5.6.5
Reference No.

ACTIVITY TITLE: Computer Lingo

OBJECTIVE: The student will define and spell terms related to programming and operation such as run, load, save, boot, bug, debug, and data base.

GRADE LEVELS:	K-3	4-6	7-8	9-12
				*

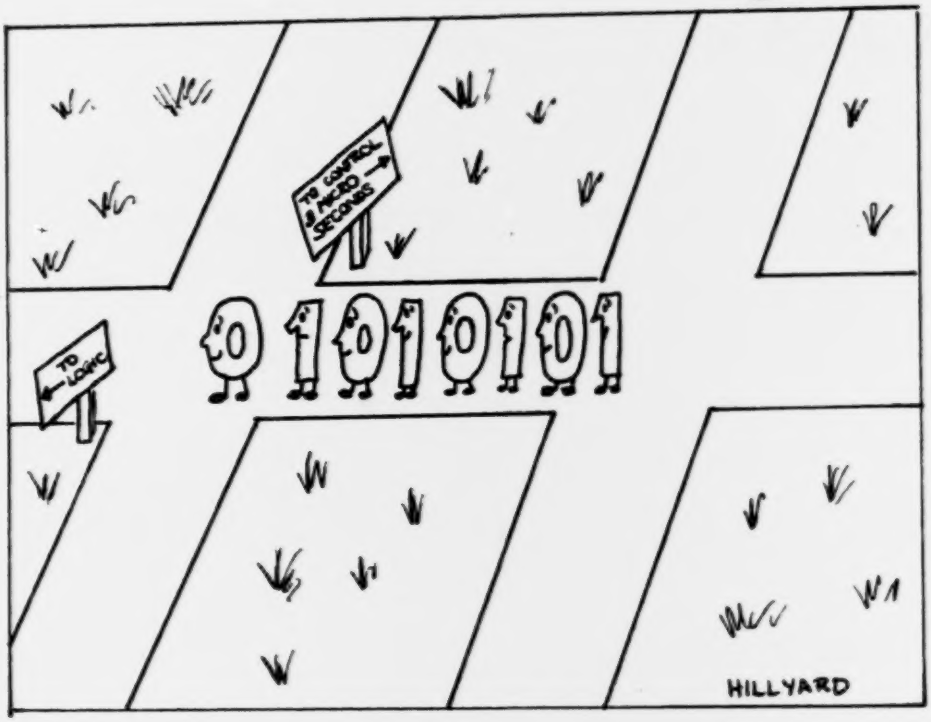
DESCRIPTION: The student will identify a computer term from the pictures on the activity sheet.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

From: Allan Dunn, Oregon City High School District #62.

6.0


TO CONTROL
8 MICRO
SECONDS
TO LOGIC
01010101
HILLYARD

SCOPE AND SEQUENCE

The X indicates instruction for that level should occur.

6. The student will learn about the structure and function of computer systems.

	K-3	4-6	7-8	9-12
The student will:				
6.1 Name the five functional units common to all computers and explain their interaction.		X	X	X
6.2 Describe how the computer operates in terms of input, processing, and output of information.	X	X	X	X
6.3 Recognize that computer operation depends on a sequence of instruction.	X	X	X	X
6.4 Describe the key advantages of computers - speed, accuracy, mass storage capabilities.		X	X	X
6.5 Describe different methods to get information into, stored, and out of the computer. (Example: Input devices = keyboard, cards, light pen, etc.).	X	X	X	X
6.6 Understand the relationship between the binary system (base 2) and Yes-No decision making.		X	X	X
6.7 Describe characteristics of various types of computer systems (Example: single computer, networks, batch processing).			X	X
6.8 Compare and contrast important characteristics of major computer brands.		X	X	X

6.0.1
Reference No.

ACTIVITY TITLE: Background

OBJECTIVE: The student will learn about the structure and function of computers.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	*

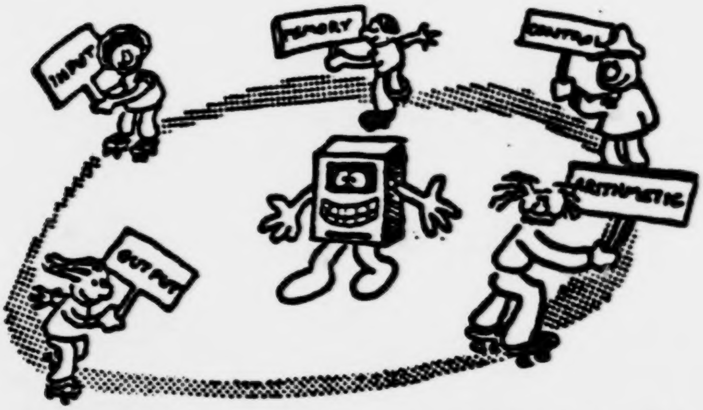
DESCRIPTION: This is a resource for teachers.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

WHAT GOES ON IN A COMPUTER?

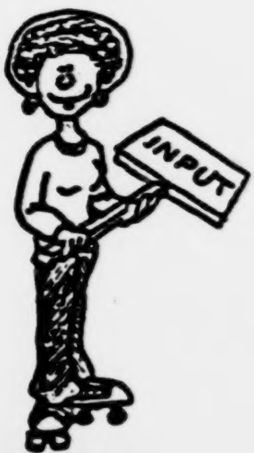
6.0.1



We can think of a computer as consisting of five main units which work together as a "system". First a system must have a way of getting the data into the computer. This unit is called an "Input Device". The data is stored in the "Memory" until we are ready to use it. When the computer processes the data it is done in the "Arithmetic or Logical Section". A computer has to make the results available to us. This is done through the "Output Device". The "Control Section" directs all operations of the other parts of the system.

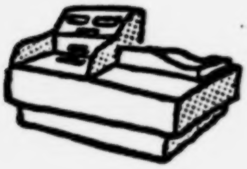
INPUT DEVICE:

Input is usually described as information that is transferred from the outside to the inside of a computer. The input device can be a typewriter like printer, or a keyboard attached to a television screen. The television screen is called a cathode ray tube (CRT). The computer can read marks and figures written in a special way or with special inks. The input may also be through holes punched in cards or paper tape. These holes are read when rays of light or tiny metal pins are passed through the holes creating electrical impulses that make up a code. The impulses transmit the data or information to the memory.

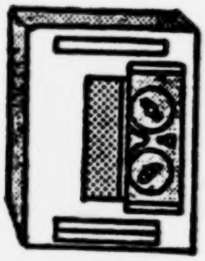


From: Meet the Computer
Used with permission of the Highline School Dist.

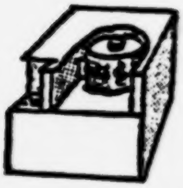
Some of the most commonly used input devices are:



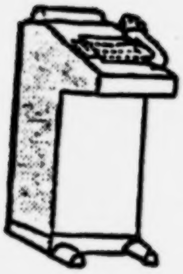
Card Reader



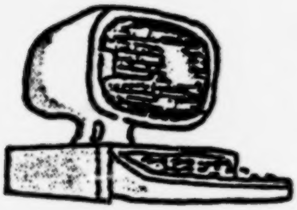
Magnetic Tape



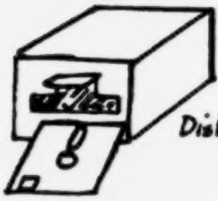
Magnetic Disk



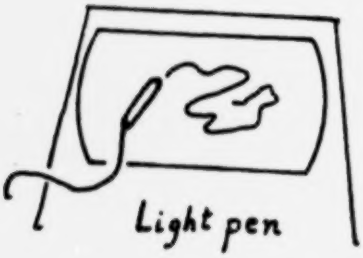
Printing Terminal
keyboard



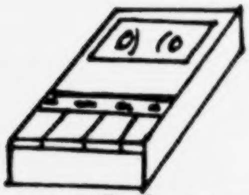
keyboard



Disk drive and disk



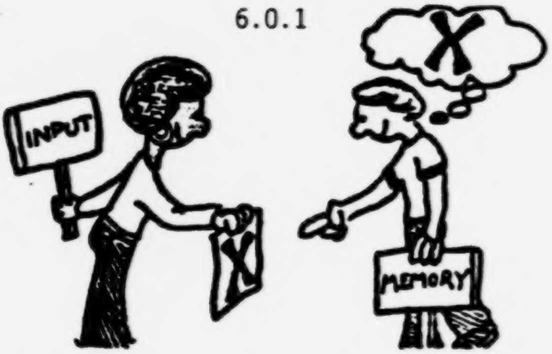
Light pen

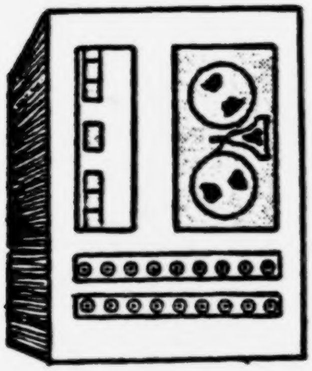


casette tape

MEMORY UNIT:

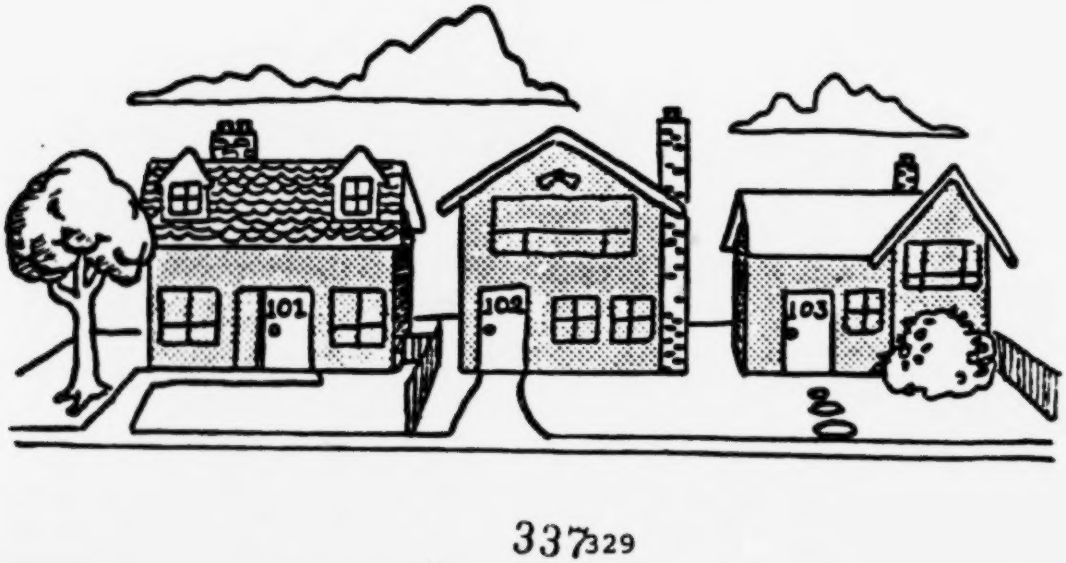
The memory unit is the part of the computer system where the data is stored. The memory receives its data from the input device. The data is stored until it is needed by the other parts of the computer.





The storage or memory section can be visualized as a large cabinet with a lot of tiny compartments. Each box contains data. All data is stored in memory before it is processed by the computer. The computer remembers the data received from the input device, and the results from the processing of the data.

The size or capacity of the storage unit determines the amount of information that can be held within the computer at any one moment. The stored data can be found quickly by the computer because each location, position, or compartment is numbered, just like the homes on your street. Instructions and data are identified by an individually numbered location called an "address".



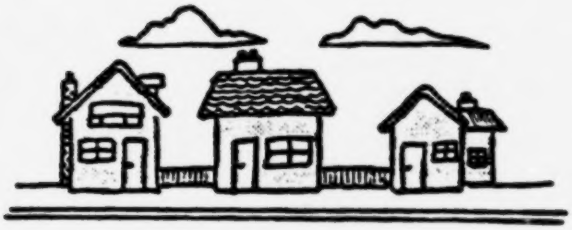
ARITHMETIC AND LOGIC UNIT:

The arithmetic and logic unit performs all of the computer's operations.

The operations of addition, subtraction, multiplication, division, and comparison are carried out in this unit. Complex calculations are combinations of the basic operations and follow a sequence of instructions. The number of instructions required for the solution of a problem varies depending upon the problem.

It is then the arithmetic and logic unit's job to give the computer instructions on what to do with its stored facts to solve the problem. The unit receives its input from the storage unit, and, after carrying out the appropriate calculations, sends the answer back to the storage unit ready for use when it is needed.

Comparing, sorting, and rearranging information are the kinds of logical operations done by computers. Just as you can sort a deck of playing cards into clubs, diamonds, spades, and hearts, or sort tests according to the score, the computer arranges any set of facts as it is instructed to do so. To help you understand the process:



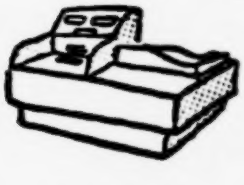
Imagine you are visiting a friend who has just moved into a new neighborhood, and you've forgotten the address but not the street. There are three similar houses on the street. You don't want to ring all the doorbells. Your friend told you that her house was the smallest of the three so you could compare them at a glance. What you are doing is comparing two at a time, eliminating one and comparing again.

The computer makes comparisons the same way, using data that it is given.

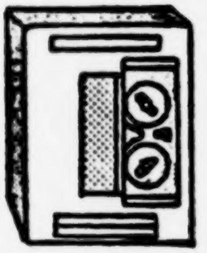
OUTPUT UNIT:

6.0.1

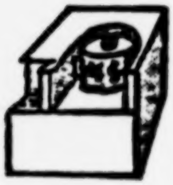
The output unit of a computer is often the same unit as those used for input. The output may be information on punched cards, punched tape, or magnetic tape. The output may also be in printed form, either on an automatic typewriter or a CRT terminal. If a large output is necessary special high speed printing devices are used. Some output devices are:



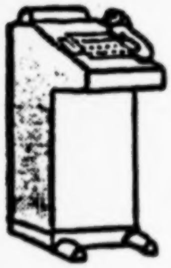
Card Punch



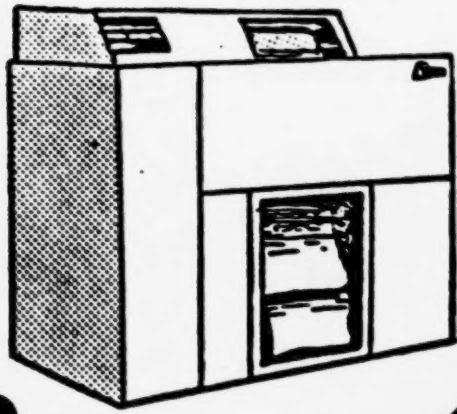
Magnetic Tape



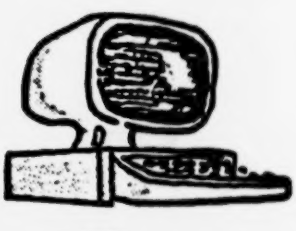
Magnetic Disk



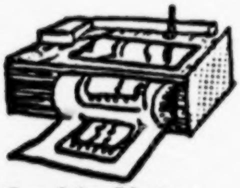
Printer



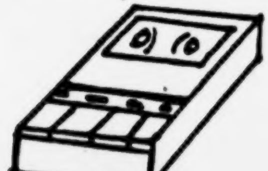
Highspeed Printer



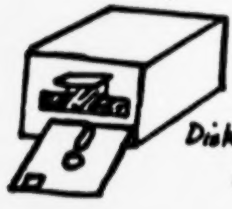
CRT



Graphic Plotter



cassette tape



Disk drive and disk

BEST COPY AVAILABLE

6.1.1
Reference No.

ACTIVITY TITLE: Five Parts Of A Computer

OBJECTIVE: The student will describe how the computer operates in terms of input, processing, and output of information.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

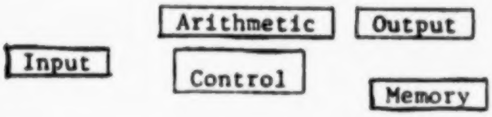
DESCRIPTION:
1. Students fill in the missing labels on a flow diagram of the 5 functional units common to all computers.
2. Students will match terms with definitions explaining how these 5 units function.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

- See "What Goes On In A Computer", section 6.0.1.
  "The Human Computer Game", section 6.2.2.
  "Input and Output Devices", section 6.5.2,
- SVE "Computer Awareness" filmstrip and cassette kit (4th Grade through Junior High).
- "Computer Literacy - The First Step" filmstrip and cassette kit (Grades 7-12).

Answer key:

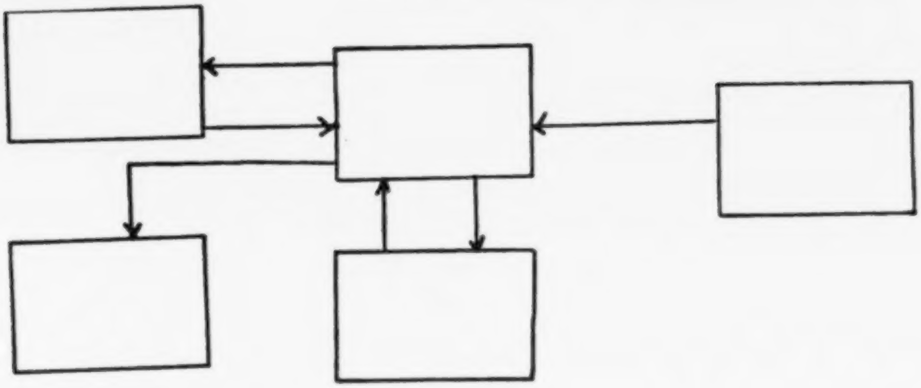


1. Control
2. Arithmetic
3. Input
4. Memory
5. Output

6.1.1

Name_________________________

FIVE PARTS OF A COMPUTER



Write these into the correct box.

Input
Arithmetic Unit
Memory
Output
Control

Using the words above, write the correct word that fits the sentence below.

1. _______________ directs traffic of data in and out of input, memory, arithmetic and output.

2. _______________ does math operations in the computer.

3. _______________ information that will be put into the computer.

4. _______________ where information is stored.

5. _______________ information that has been process by the computer.

6.2.1
Reference No.

ACTIVITY TITLE: Input, Output And Inbetween

OBJECTIVE: The student will describe how the computer operates in terms of input, processing, and output of information.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*			

DESCRIPTION: Primary age children can be taught the idea of input, output, and processing by using analogies. For example, an input can be a dirty car, processing a car wash, and output a clean car. In the same way information is entered into the keyboard acted on (or processed) in the computer, and the output is seen on the screen. Work with students creating more input - processing - output analogies (for example: dull pencil, pencil sharpener). The worksheet can be used for follow-up.

MATERIALS REQUIRED: Input, Output And Inbetween Worksheet

ADDITIONAL RESOURCES:

For teacher background see, "What Goes On In A Computer", section 6.0.1.

Be A Computer Literate by Marion Ball and Sylvia Charp.

If a computer is available, run a program. Show the steps of input, processing and output. Input - entering numbers or letters into keyboard; processing - the part that goes on in computer that can't be seen; output - what is seen on the screen that has changed.

Name ____________________

INPUT, OUTPUT and INBETWEEN

INPUT	PROCESSING	OUTPUT

Make a drawing of input, output and processing.

6.2.1

6.2.2
Reference No.

ACTIVITY TITLE: The Human Computer Game

OBJECTIVE: The student will describe how the computer operates in terms of input, processing, and output of information.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: Follow the directions in the "Human Computer Game" to review how information is processed in the computer.

MATERIALS REQUIRED: Human Computer Game

ADDITIONAL RESOURCES: See "What Goes On in a Computer", section 6.0.1.

See related activity section 5.4.1.

6.2.2

THE HUMAN COMPUTER GAME

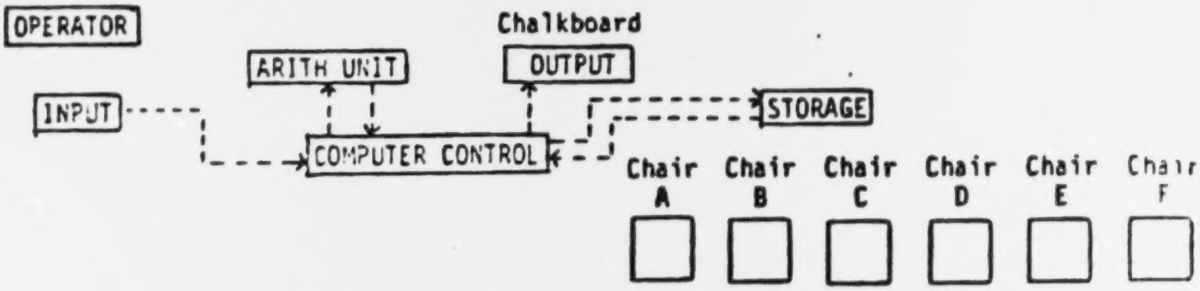
Computers are complex machines but a rough idea of how they work can be demonstrated with a few volunteers, name cards, and a program. So proceed to build your own human computer.

Materials needed:

1) Tag board for name cards
2) 3" x 5" cards for entering your own programs
3) Pen and pencil
4) Chalkboard or other visual display (overhead projector, large piece of paper and felt-tipped pen, etc.)
5) 6 chairs
6) String for name cards

Directions:

1) Cut our programs "Averaging" and "Height". See following pages.
2) Cut out name tags and string up to hang people. Glue to tagboard if necessary for added strength.
3) You will need 6 people. Put name tags on them for proper identification (INPUT, OUTPUT, ARITHMETIC UNIT, COMPUTER CONTROL, STORAGE, OPERATOR)
4) Arrange the room as follows:



5) Each person has his own job, as described BELOW:

INPUT: Input accepts information (including the program) for the computer. Input gives information to Computer Control.

COMPUTER CONTROL: Computer Control "runs" the program when directed by the operator, and decides what must be done by each of the parts of the computer. Only one action is done at a time. If a comparison is needed, the job is sent to ARITH UNIT with the two items to compare. If information is to be printed it goes to OUTPUT. If information is to be stored, it goes to STORAGE. Also, Computer Control can get information previously saved in Storage.

ARITH UNIT: Does operations, logical comparisons, and acts as a "calculator". It must be requested by Computer Control and must be given the information it is to operate on. It returns the answer to control. Note: It can compare only two items at a time.

OUTPUT: Will write out what Computer Control wants printed (chalkboard). He is the only one who gives information to the operator.

STORAGE: Storage will store information in labeled area (six lettered chairs). Also, Storage, upon request by Computer Control, will give the value in a specific location.

OPERATOR: The operator is not a part of the computer but is working the computer and must provide input at the proper time.

6) You are now ready to run the "Averaging" program. Give the "Averaging" cards to the operator. Run the "Averaging" program as directed below.

   a) The operator inputs cards 1-7 in any order. Input gives cards to control.

   b) Control arranges cards from 1 to 7 and waits for the RUN card.

   c) Operator inputs the run card.

   d) Control sends card 1 to output. Output will write what is in quotes.

   e) Control does the same as above with card 2.

   f) Control directs input to wait for operator to enter two numbers on a card. When received, input gives numbers to control (card 3).

   g) Control directs storage to copy first number in Storage A (put on another card) and second number in Storage B (card 4).

   h) Control directs Arithmetic Unit to add values in A and B and divide by 2. Answer is returned to control. (Use the original input card and card 5 to give directions to Arith Unit).

   i) Control directs output to print the two numbers in storage A and B and the answer from Arith Unit (card 6).

   j) Control ends execution (card 7).

7) Now run "HEIGHT". See if your computer can follow directions.

8) For a check of your human computer system you might have "Control" unaware of who the three people to be compared are and see if you get the proper result. The only person who needs to know who is in storage is the "Arithmetic Unit".

9) Now it is up to you to write a program for the human computer. Fill out the 3" x 5" cards with your short program and give them to the computer operator - good luck.

Source possibilities:

a) Put a whole number in storage and see if it is divisible by inputted numbers.
b) Add a group of numbers.
c) Find the largest of a group of numbers.
d) ?

CARD 1

TO OUTPUT:

WRITE ON BOARD:

"THIS IS A PROGRAM TO AVERAGE TWO NUMBERS"

Averaging

CARD 2

TO OUTPUT:

PRINT ON BOARD:

"GIVE ME TWO NUMBERS."

Averaging

CARD 3

DIRECT INPUT to wait for operator to put two numbers in. (Use 3X5 cards to enter numbers). Give numbers to CONTROL.

Averaging

CARD 4

DIRECT STORAGE to Make a copy of first number in Storage A (Chai A) and the second in Storage B.

Averaging

CARD 5

DIRECT ARITH. UNIT to add the contents of A and B and divide by 2 ($\frac{A+B}{2}$) and return answer to control.

CARD 6

TO OUTPUT:

PRINT ON BOARD:

"THE AVERAGE OF ________ AND
(value of A)

________ IS ________________."
(value of B) (value from Arith Un

CARD 7

END PROGRAM

RUN

CARD 1

To OUTPUT: Write on BOARD:
"This program will tell
WHO IS TALLEST, NEXT TALLEST,
AND SHORTEST."

Height

CARD 2

To OUTPUT: Write on BOARD:
"GIVE ME THREE PEOPLE."
(Note: DATA will be their heights)

Height

CARD 3

DIRECT INPUT to wait for the names of three people, then fetch those people and give to CONTROL

Height

CARD 4

DIRECT STORAGE to put the first person in Seat A, the second in B, and the third in C.

Height

CARD 5

DIRECT ARITH. UNIT to compare the heights of "DATA" in Seat A and B and return answer of who is tallest of the two.

Height

CARD 6

DIRECT STORAGE to put the answer from Arith. Unit in Seat A and other in B.

Height

CARD 7

DIRECT ARITH. UNIT to compare the heights of "DATA" in storage Seats B and C and return answer of who is tallest of the two.

Height

CARD 8

DIRECT STORAGE to put the answer from Arith. Unit in Seat B and other in Seat C.

Height

CARD 9

DIRECT ARITH. UNIT to compare the heights of "DATA" in Seat A and B and return answer of who is tallest of the two.

Height

CARD 10

DIRECT STORAGE to put the answer from Arith. Unit in Seat A and other person in B.

Height

CARD 11

TO OUTPUT: Write on Board:

"________________ is TALLEST."
(Name of person in Seat A)

"________________ is NEXT TALLEST."
(Name of person in Seat B)

"________________ is SHORTEST."
(Name of person in Seat C)

Height

CARD 12

END PROGRAM

Height

RUN

Height

OUTPUT

6.2.2

INPUT

ARITH. UNIT

CONTROL

STORAGE

OPERATOR

6.2.2

seat A	seat B
seat C	seat D
seat E	seat F

6.3.1
Reference No.

ACTIVITY TITLE: Robot Simulation

OBJECTIVE: The student will recognize that computer operation depends on a sequence of instructions.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	

DESCRIPTION: This activity introduces and reinforces the concept of sequencing a series of precisely defined commands. This activity could be extended to develop a programming language which is unique to a class or classroom.

MATERIALS REQUIRED: Activity sheets for instructor

ADDITIONAL RESOURCES: Students could be asked to bring in examples of programmed or programmable cars, trucks, and robots.

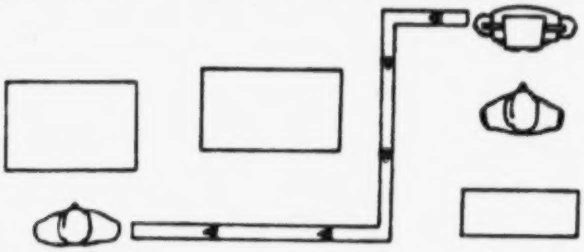
Are You Computer Literate?

6.3.1

ROBOT SIMULATION

A delivery robot is used by some large businesses. It is a motorized cart that automatically moves between various desks on one floor of a very large office building. When it reaches a desk, it stops and says "bleep bleep". It waits a few seconds so the person working at the desk can put mail and packages onto the car or take some off. Then it automatically goes on to the next desk.

Select one person to play the role of robot, and you be the robot's "programmer". Your task is to direct the robot to carry a written message from one part of the room to another. Assume initially that the robot is standing facing you, as in the picture below.



Your Instruction	Robot's Response
1. Raise your right forearm until it is parallel to the floor and extended straight forward.	1. Robot raises right forearm as directed.
2. Prepare to grasp a piece of paper by opening a space between thumb and index finger.	2. THAT DOES NOT COMPUTE! (The robot can't do this because you haven't said which hand.)
3. Open up a space between thumb and index finger of right hand.	3. Robot opens right hand in a grasping position.
4. You now insert the written message into the robot's hand and give it the instruction: Close the thumb and index finger of right hand together.	4. Robot grasps the piece of paper.
5. Turn right 1/4 of a full turn.	5. Robot turns right 1/4 turn.
6. Take one step forward.	6. Robot takes one step forward.
7. Turn left 1/4 of a full turn.	7. Robot turns left 1/4 turn.
8. Etc., etc., etc.	

In directing the robot you must make sure that it does not run into a chair, desk, bookcase, or a person. Thus, you must continually observe its location and figure out the consequences of what you are telling it to do.

Whenever you give an instruction that is not clear (such as turn 1/4 of a full turn") the robot is to respond THAT DOES NOT COMPUTE! Each instruction must be precise and it must have exactly one possible meaning.

After you have played this type of game for awhile, you will see the advantage of shortening the instructions. Thus, you may want your robot to be constructed so that it can understand and carry out instructions such as the following:

Your Instruction	Robot's Response
1. Raise right forearm.	1. Robot raises right forearm by bending right arm at the elbow. The right forearm is to be parallel to the floor and extended straight forward.
2. Prepare right hand to grasp.	2. Robot opens right hand so there is a space between the thumb and index finger.
3. Grasp with right hand.	3. Robot grasps with thumb and index finger of right hand.
4. Turn right 1/4 turn.	4. Robot turns right 1/4 of a full turn.
5. Etc., etc., etc.	

The instruction used in computer programming languages are usually very brief. Thus, it takes some effort to learn their precise meaning. That is part of what is involved in learning a programming language.

ROBOT GAME NUMBER TWO

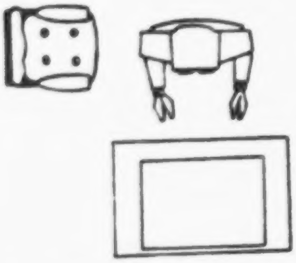
In the first robot game the person directing the robot serves as its eyes, and continually observes the robot's location. Thus the programmer continually adjusts the robot's program, to keep the robot from doing something wrong. But the robot really isn't very useful if a person has to follow it around and tell it exactly what to do at each step.

We can get around this by adding some sensing devices to our robot. We can give it a television camera or a radar set for an eye, and a sense of touch.

With these features, we can program our robot in advance, so that it can automatically carry our an assigned task. Some examples of this are given in the following piece of a program. The idea is that the robot receives the entire program in advance, and stores it in its memory. When told to GO it then carries out the program.

	Program Step	
1.	Raise right forearm.	
2.	Prepare right hand to grasp.	
3.	Signal.	Robot goes "bleep bleep" to attract a person's attention. During this time the person is to insert the paper into the robot's hand and hold it there until the robot grasps it.
4.	Wait 14 seconds.	
5.	Grasp.	
6.	Turn right 1/4 turn.	
7.	Is pathway clear for one step?	Robot examines pathway in front of itself, using its eye. Result is a "yes" or "no" answer that is stored in its memory.
8.	If "yes" go to step 12. Otherwise go to step 9.	
9.	Signal	Robot goes "bleep bleep" to attract someone's attention. The robot then waits for the obstacle to be removed, and tries again.
10.	Wait 5 seconds.	
11.	Go to step 7.	
12.	Take one step forward.	
13.	Etc., etc., etc.	

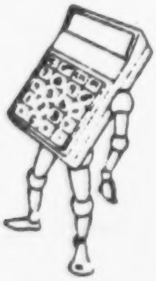
As you can see, programming a robot such as this requires careful and detailed thought. Also notice how stupid the robot actually is. Suppose that the picture is as follows:



The robot following the program extends its forearm and prepared to grasp. But there is no person there to give the robot a piece of paper. The robot grasps (nothing) and turns right. But now a chair is in its pathway. It goes "bleep bleep" and waits 5 seconds. Then it goes "bleep bleep" and waits 5 seconds. Then it goes "bleep bleep" and waits 5 seconds. . . Our robot will continue to do this until its power source is exhausted.

Summary

Most "smart" machines are not very smart. But they can carry out the tasks they are designed to do. Often a task is one that used to be done by human workers. The smart machine replaces a human worker in order to cut down costs. But it also may put a person out of a job. This is a difficult problem that society must face. It is also a problem that you may face some day.



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From: Are You Computer Literate?

6.4.1
Reference No.

ACTIVITY TITLE: How Much And How Fast?

OBJECTIVE: The student will describe the key advantages of computers.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: How much and how fast is an activity which will introduce, via counting and multiplication, the concepts of computer capacity, mass storage and printing speed.

MATERIALS REQUIRED: Activity sheet for instructor (or each student)

A variety of books (at least one per student), preferably novels.

ADDITIONAL RESOURCES: Several pages of "computer print out" to illustrate the printout capabilities of a computer.

Are You Computer Literate?

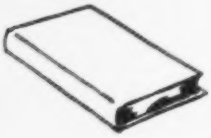
6.4.1

HOW MUCH AND HOW FAST?

Storage Space

Estimate the number of characters in an average book, by doing the following:

1. Select a medium size book.



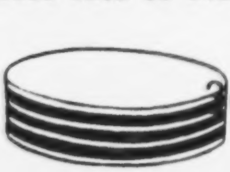
2. Find out how many characters there are on an average page. Count letters, digits, punctuation marks and blank spaces between words and sentences.
3. Use this information and the number of pages to find the total number of characters per book.
4. Do this for two more books.
5. Find the average length of your three books.

Computer people use the letter K to represent the number 2^{10}, which is 1024. One can buy a $1000 microcomputer with primary memory that can store 16K or 32K characters. What number is 16K? 32K? What fraction of an "average" book can be stored in a 32K microcomputer?

Suppose that a reel of magnetic tape is recorded at a rate of 6250 characters per inch. If the reel is 2400 feet long, how many characters will one tape hold? How many of your average length books could you store on this tape?

A modern disk pack can store 600 million characters. How many average books can be stored on one disk? Could an entire set of encyclopedias be stored on one disk pack?

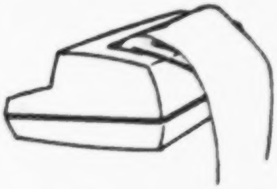
Suppose that this disk is rotating at 3000 revolutions per minute. How long will it take to make one revolution? Suppose that it takes at most 1/20 of a second for the read/write head to get to any track on the disk. This is called the maximum seek time. Thus, the greatest amount of time it takes to find a piece of stored data is one revolution time plus seek time. How long is this?



6.4.1

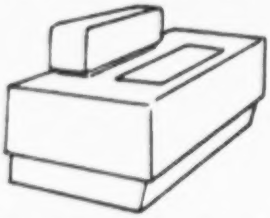
Printing Speeds

In the story "The Nine Billion Names of God" by Arthur C. Clarke, a computer is used to print out nine billion different names for God. Suppose that an average name is six characters in length. Hardcopy keyboard terminals often print 10 to 30 characters per second.



What is the range of times it would take one of these terminals to print the nine billion names? (Note that it takes as long to print a blank space after a name as to print a letter in a name.)

Impact line printers range in speed from 300 to 1800 lines per minute, where a line is 132 characters long. Express this printing speed characters per second. What is the range of times that it would take an impact line printer to print all the names?



Electrostatic printers which use a Xerox-like process have a speed of 14,000 to 18,000 lines per minute, where a line may be up to 132 characters in length. What is this printing speed in characters per second? What are the longest and shortest time periods that this non-impact printer would take to print the nine billion names?

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From: Are You Computer Literate?, pages 23-25.

6.5.1
Reference No.

ACTIVITY TITLE: Input And Output Devices

OBJECTIVE: The student will describe different methods to get information into, stored, and out of the computer.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*			

DESCRIPTION:

1. Show the students the keyboard as the device for entering information (input).
2. Show them the TV screen as the device for output.
3. Demonstrate by typing in letters, names of students and this will be displayed on screen.
4. The teacher should type in the program which is listed in Section 3.5.5 to allow students to create a design on the screen using keyboard input.
5. If you have the music disk (Public Domain) from OECC, load and play several tunes as an example of audible output.

MATERIALS REQUIRED: Microcomputer

ADDITIONAL RESOURCES: See Input And Output Devices 6.0.1 (Grades 4-6).

Public Domain Music Disk From Oregon Educational Computer Consortium (OECC).

6.5.1

Name____________________________

INPUT AND OUTPUT DEVICES STUDENT WORKSHEET

Write in the spaces provided whether this is INPUT or OUTPUT device or both.

1. ______________________________ CRT (TV Screen)

2. ______________________________ Cassette Tape

3. ______________________________ Keyboard

4. ______________________________ Printer

5. ______________________________ Light Pen

6. ______________________________ Card Reader

7. ______________________________ Disk Drive

6.5.2
Reference No.

ACTIVITY TITLE: Machines That Talk With The Computer

OBJECTIVE: The student will describe different methods to get information into, stored, and out of the computer.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: Review with the students input and output devices using 6.0.1.

If a microcomputer is available, show the input as the keyboard and disk drive or cassette tape. The output is the CRT (TV screen) and can by the cassette tape or disk drive if data is recorded on it by a programmer or user.

As a review, have students fill out "Input, Output Devices" worksheet.

MATERIALS REQUIRED: Explanation of: Input, Output Devices

Worksheet for Input, Output Devices

See also section 6.0.1

ADDITIONAL RESOURCES: Correlates With Computer Literacy - The First Step
Input
Output

6.6.1
Reference No.

ACTIVITY TITLE: Binary Blackout

OBJECTIVE: The student will understand the relationship between the binary system and yes - no decision making.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*		

DESCRIPTION: Provide the students with instruction on the base two numbers from 1 to 6. You may wish to use the following chart to clarify base two place value for students.

BASE 2			BASE 10
FOURS	TWOS	ONES	
0	0	1	1
0	1	0	2
0	1	1	3
1	0	0	4
1	0	1	5
1	1	0	6

Use the Binary Blackout game that follows for reinforcement.

Directions: First player rolls a dice and covers or crosses out the corresponding base 10 number on his Blackout board. Play continues till a player has covered all of the numbers.

MATERIALS REQUIRED: Base two dice
Binary Blackout boards
Base Two chart - if needed

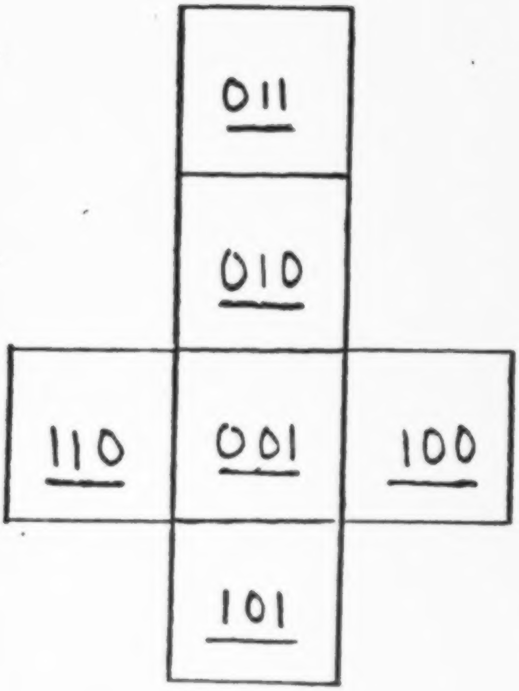
ADDITIONAL RESOURCES: Computer Tutor

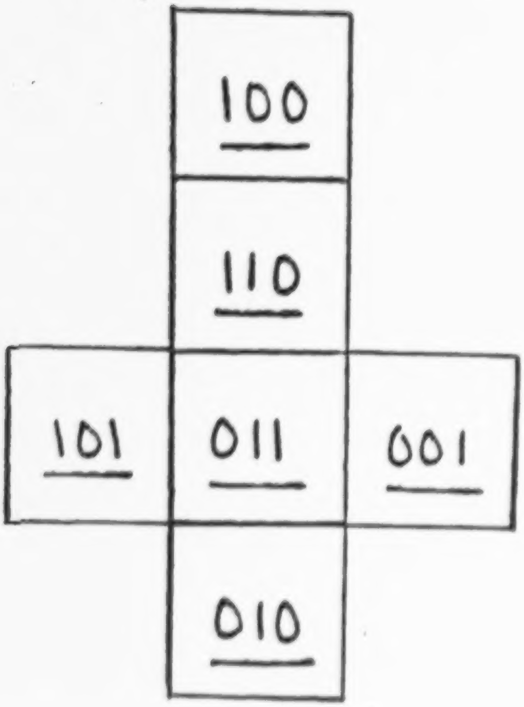
BINARY BLACKOUT SHEET

Binary Blackout		
1	2	3
4	5	6

Binary Blackout		
1	2	3
4	5	6

Base Two Dice Patterns


011
010
110
001
100
101


100
110
101
011
001
010

Base Two Chart

$001_{\text{two}} = 1$

$010_{\text{two}} = 2$

$011_{\text{two}} = 3$

$100_{\text{two}} = 4$

$101_{\text{two}} = 5$

$110_{\text{two}} = 6$

6.6.2
Reference No.

ACTIVITY TITLE: Space Signals

OBJECTIVE: The student will understand the relationship between the binary system (base 2) and Yes-No decision making.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	

DESCRIPTION: This activity illustrates the use of the binary system to encode pictures. The student will learn to convert binary numbers to decimal numbers.

MATERIALS REQUIRED: Student activity worksheets
Color crayons or felt tip markers

ADDITIONAL RESOURCES:

6.6.2

SPACE SIGNALS

A Binary Encoded Picture

The cameras aboard space probes (Mariner, Pioneer, etc.) typically convert pictures into strings of binary number. In this activity, the student takes such a string of binary number, converts them to their decimal equivalents and creates a color picture.

A Space camera breaks its field of view into many regularly spaced areas. It then assigns to each area a number corresponding to the brightness received from that area. There can be many possible levels of brightness. In this exercise there are thirty-two different levels. Each is symbolized by a five digit binary number - 00000 = $0_{\text{base 10}}$ to 11111 = $31_{\text{base 10}}$. A station on earth receives the binary signals and converts them back into a black and white picture. The student acts as an earth station receiving an unknown signal. Rather than trying to creat thrity-two levels of brightness (grey scale), each binary number represents a color.

The coded picture in the student activity is a lake surrounded by flowers and trees.

Example:

11011	00010	00010	01100	11000	01110	00110	11000	10101	01100	00010	00110
27	2	2	12	24	14	6	24	21	12	2	6
blank	green	green	green	blank	blank	blank	blank	green	green	green	blank

Permission to Use From Oregon Mathematics Teacher, November-December, 1979, by Frazier Boergadine.

SPACE SIGNALS

Convert each binary number in the code into its decimal equivalent. Use the key and color the appropriate box in the grid.

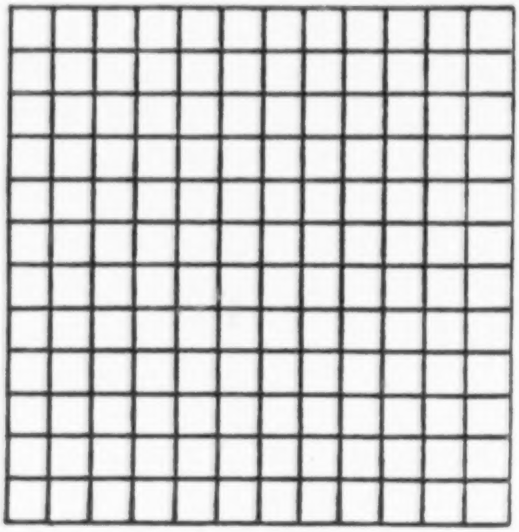
Code:

11011	00010	10010	01100	11000	01110	00110	11000	10101	01100	00010	00110
11000	01100	00011	10010	11011	00001	10000	01110	10010	11100	10101	11011
00110	10101	00100	00010	11000	10011	11101	00110	00010	01011	10010	01110
11011	01110	01011	00110	01110	11011	11000	11011	01110	00011	11011	11000
10101	01100	11100	00010	01001	10110	10110	01010	10101	00100	10010	00010
00010	10010	00100	10101	10111	01010	01001	10110	00010	00011	10010	10101
11111	01000	11010	01001	01010	10111	10111	01010	10111	10001	01111	10001
10100	01101	11111	01010	10110	01001	10111	01010	10110	01111	00101	11001
01000	11010	10100	00111	11110	00101	01000	11111	11111	11001	10001	01111
00011	00010	01011	00101	00001	01101	11010	10001	10100	00100	01100	11100
01011	10010	00100	01101	01101	00111	10100	01000	11010	00011	10101	01011
11100	10101	00011	11100	10010	01011	00100	00010	01011	11100	10010	00011

Key:

0 - Black
1 - Yellow
2 - Green
3 - Brown
4 - Brown
5 - Orange
6 - Blank
7 - Orange
8 - Purple
9 - Blue
10 - Blue
11 - Brown
12 - Green
13 - Orange
14 - Blank
15 - Red

16 - Yellow
17 - Red
18 - Green
19 - Yellow
20 - Purple
21 - Green
22 - Blue
23 - Blue
24 - Blank
25 - Red
26 - Purple
27 - Blank
28 - Brown
29 - Yellow
30 - Orange
31 - Purple



6.6.3
Reference No.

ACTIVITY TITLE: The Numbers Game

OBJECTIVE: The student will understand the relationship between the binary system (base 2) any Yes - No decision making.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: This is a number game, based on the binary system, which illustrates how just "Yes or No" answers may be combined to give non-obvious information.

MATERIALS REQUIRED: A set of cards as illustrated on activity sheet

ADDITIONAL RESOURCES: See second page of activity for background information and methods of extending the activity to a 5, 6, or 7 card set.

Are You Computer Literate?

6.6.3

THE NUMBER CODE

Here's a number trick to play on your friends. Make four cards like these shown:

C-		
10	9	8
13	12	11
	15	14

O-		
6	5	4
13	12	7
	15	14

D-		
6	3	2
11	10	7
	15	14

E-		
5	3	1
11	9	7
	15	13

Ask a friend to select a number from 1 to 15. Then tell the person you are going to guess the number. Hold up each card and ask if the number is on that card. After your friend's "yes" or "no" responses you should be able to guess the number.

Do you know how it works? The number game is based on the binary system. Think of the N's and Y's standing for 0's and 1's. The binary place values are:

	8	4	2	1	
If your friend had picked the number 1, the response should have been: 1	n	n	n	y	
For the number 6:	n	y	y	n	
See if you can figure out the value of these responses:					
	n	n	y	n	= ________
	y	n	n	n	= ________
	n	n	y	y	= ________
	y	n	n	y	= ________
	y	y	y	n	= ________
	n	n	n	n	= ________
	y	y	y	y	= ________

Try making up a 5 card game. This should allow any number form 1 to 31 to be guessed. Think of a 5 letter name for the cards.

See second activity page for additional information.

Used by Permission of dilithium Press.
From: Are You Computer Literate?, page 51.

THE NUMBERS GAME

I. How the game works.

For each "yes" response, add the numbers which appear in the upper right hand corner of the card.

i.e., since 7 = 4 + 2 + 1, a person will answer "yes" for those cards with a "7" on them (which only appears on the cards that have the 1, 2, and 4 in the upper right hand corner.)

II. How to extend the game to 5 cards.

a) 1 = 1
2 = 2
3 = 2 + 1
4 = 4
5 = 4 + 1
6 = 4 + 2
7 = 4 + 2 + 1
8 = 8
9 = 8 + 1
10 = 8 + 2
11 = 8 + 2 + 1
12 = 8 + 4
13 = 9 + 4 + 1
14 = 8 + 4 + 2
15 = 8 + 4 + 2 + 1

As illustrated, the numbers 1 through 15 can be expressed using only 1's, 2's, 4's, and 8's. Also, since 11 = 8 + 2 + 1, the 11 is only on the cards with 8, 2 and 1 in the upper right hand corner.

b) To extend the game card set to 5 cards, make a 5th card with a 16 in the upper right hand corner.

16 = 16
17 = 16 + 1
18 = 16 + 2
19 = 16 + 2 + 1
20 = 16 + 4

c) Next, you will need to list the number 17 on the "16" and "1" cards, list the number 18 on the "16" and "2" cards, list the number 19 on the "16" and "2" and "1" cards, etc.

This process will take you through the numbers 1 - 31.

III. Infinite Extension

The numbers game may be extended infinitely by using cards with powers of two (binary system) in the upper right hand corner, i.e., 1, 2, 4, 8, 16, 32, 64, 128, etc.

6.6.4
Reference No.

ACTIVITY TITLE: Manual Computer Cards

OBJECTIVE: The student will understand the relationship between the binary system (base 2) and yes - no decision making.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Student will create punched cards to help work with the Base 2 System.

MATERIALS REQUIRED:

15	3" x 5" cards
1	Paper clip
	Scissors
	Hand hole punch
	Pencil

ADDITIONAL RESOURCES: See activity 1.1.5.

DIRECTIONS TO MAKE
MANUAL COMPUTER CARDS Base 2

6.6.4

The following cards can be made to help work with the Base 2 system. After completing the cards you can try the assignments that follow.

Materials Needed:

15 3x5 cards

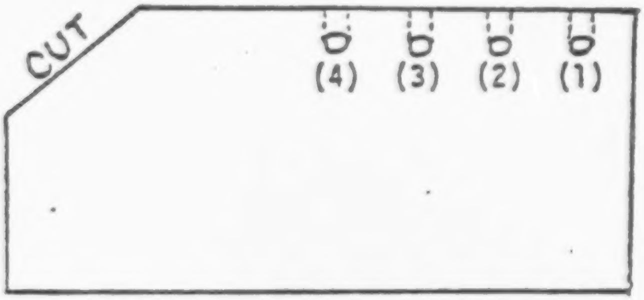
1 paper clip

Tools Needed:

Scissors

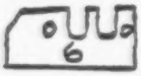
Hand hole punch

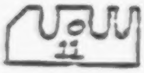
Pencil



Directions:

1. First, cut the corner of each card as indicated above.
2. Using the hand hole punch punch holes as indicated above, being sure that the holes line up when the cards are stacked.
3. Number each card, starting with 1 on the first and 15 on the last.
4. Cut out slots as indicated by the dotted lines above. Follow the guide below. For example, card 1 should have only the slot for hole number 1 cut out.

Example: 

Example: 

Card No. 1 - cut slot 1

Card No. 2 - cut 2

Card 3 - cut 1,2

Card 4 - cut 3

Card 5 - cut 1,3

Card 6 - cut 2,3

Card 7 - cut 1,2,3

Card 8 - cut 4

Card 9 - cut 1,4

Card 10 - cut 2,4

Card 11 - cut 1,2,4

Card 12 - cut 3,4

Card 13 - cut 1,3,4

Card 14 - cut 2,3,4

Card 15 - cut 1,2,3,4

5. Bend the paper clip to make an "L" shape and take a look at what can be done with your cards in the Lesson, "Manual Computer Cards".

Assignment:

1. Make a set of Manual Computer Cards.
2. Why do you think the corners of the cards are cut? 6.6.4
3. Write the decimal numbers of the cards and then write the base 2 number indicated by the slots.

Example:	Decimal	Binary	Binary Values
	13	1101	8 + 4 + 1 = 13

4. Make a hook with the paper clip. Put the cards together so the holes line up. Insert the clip and hold number 1 and carefully pull out all the non-slotted cards and place in the back of the stack. Do the same with positions 2, 3 and 4. What is the result?
5. Even whole numbers are numbers divisible by 2, (2,4,6...). Using the paper clip can you separate the odd numbers from the even with just one pull? What is the difference between an odd and even number in binary?
6. See if you can describe how to separate the following cards from your deck.
    a. Separate those less than 8 from those greater than or equal to 8.
    b. Separate those less than 4 from those greater than or equal to 4. (It may take more than one pull.)
    c. Find the card slotted 1010 (it may take more than one pull).
7. Make a deck of 31 cards. Try the above assignments with this deck.
8. Share anything else you discovered with the cards with others.

Grading:

For a C: Do assignment 1,2,3,4
B: Do assignment 1,2,3,4,5,6
A: Do assignment 1,2,3,4,5,6,7,8

From: What to Do Until the Computer Comes
by Alan Dunn.

BEST COPY AVAILABLE

6.7.1
Reference No.

ACTIVITY TITLE: Batch Processing Network And Timeshare Simulations

OBJECTIVE: The student will describe characteristics of various types of computer systems.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: By involving the students in these three simulations, the concepts of batch processing, networking, and timesharing of users with a central computer will be clear.

MATERIALS REQUIRED: Use computer glossary section 5.0.2

ADDITIONAL RESOURCES: Could substitute telephone book or other items.

BATCH PROCESSING, NETWORK AND TIMESHARE SIMULATIONS

1. Batch Processing

For the activity, 4 students will be needed as users, and one student with a glossary as the processor. Each user writes down on a piece of paper a word for which a definition is needed. The processor takes the first request, completes it and takes the next one, completes that until all the requests are done.

2. Networking

In this simulation, 4 student users, one controller and one processor (with the dictionary) will be needed. The 4 users write down the words for which defintions are needed. These are handed at the same time to the controller. The controller accepts and clarifies them, then hands the requests to the processor which finds the definitions in the order presented.

3. Timesharing

Four users, one processor and a controller are needed for this activity. The 4 users each request a definition and these are handed to the controller. The controller gives the 4 request to the processor. The processor gives the first line of definition for each of the words to each of the users. Then it will give the second line of the definition to each of the users. The processor cycles through all the words in this fashion.

6.8.1
Reference No.

ACTIVITY TITLE: Learning About Different Computer Brands

OBJECTIVE: The student will compare and contrast important characteristics of major computer brands.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION:

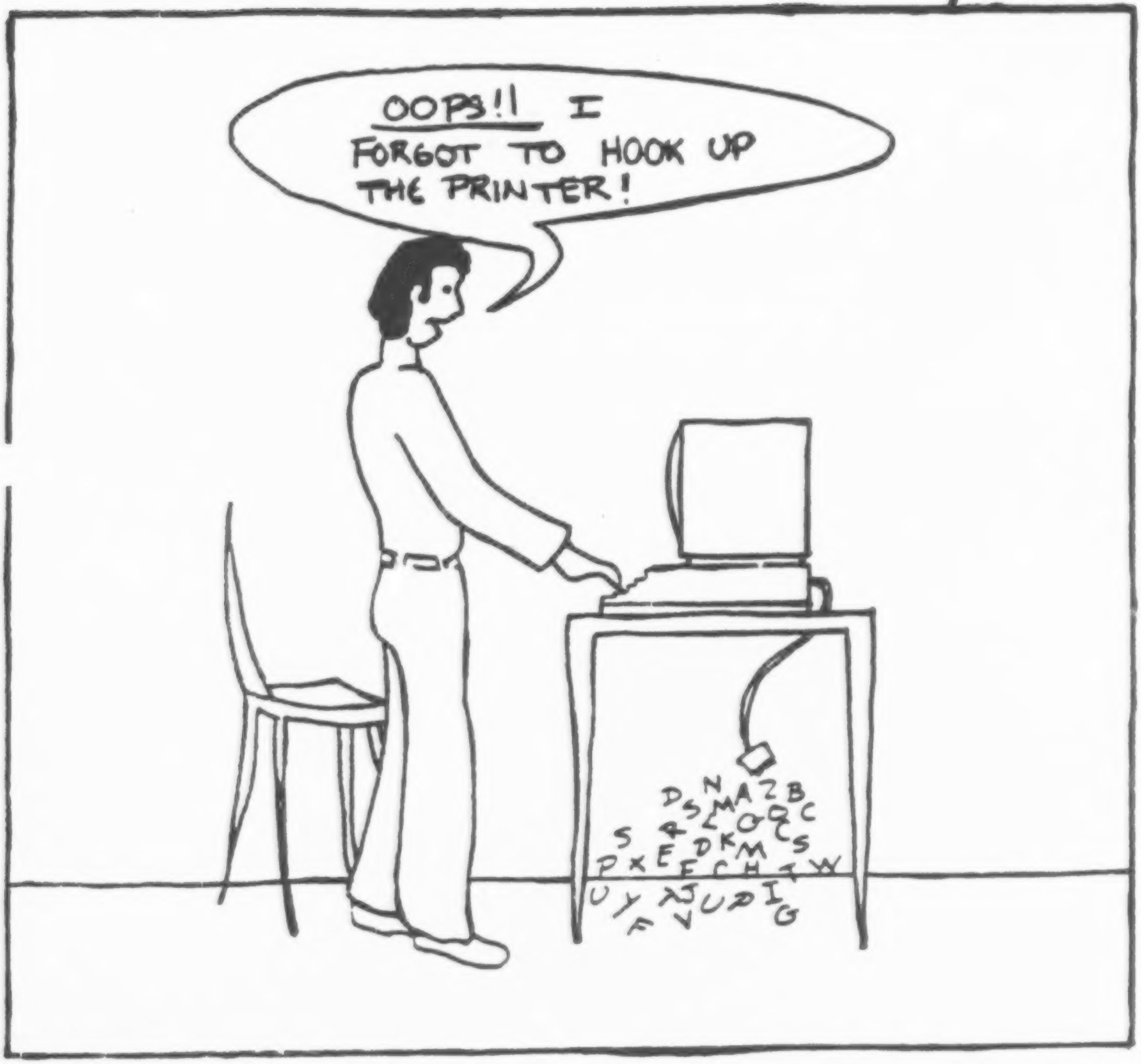
1. Invite computer salesmen from various computer stores to demonstrate and present microcomputers (Apple II, Radio Shack, Commodore, PET, Texas Instrument, Atari).
2. Collect brochures about the various microcomputers for reference materials.
3. Ask students as a project to research different brands and report on them to the class.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES: Money Article section 3.7.1.

Crossword Puzzle section 5.3.4.

7.0


OOPS!! I FORGOT TO HOOK UP THE PRINTER!

SCOPE AND SEQUENCE

The X indicates instruction for that level should occur.

7. The student will learn how to care for and operate the computer equipment and storage media.

	K-3	4-6	7-8	9-12
The student will:				
7.1 Learn how to set up, maintain, and store computer equipment.		X	X	X
7.2 Describe and demonstrate proper care of storage media.	X	X	X	X
7.3 Demonstrate how to begin operation, load and run program, and end operation.	X	X	X	X
7.4 Demonstrate recognition of errors in interacting with computers and is able to correct them.	X	X	X	X
7.5 Demonstrate use of keyboard and special features (editing, control, etc.).	X	X	X	X
7.6 Demonstrate how to save, delete, and protect programs on peripherals.		X	X	X
7.7 Demonstrate keyboarding skills using the touch method.	X	X	X	X

7.0.1
Reference No.

ACTIVITY TITLE: Ergonomics

OBJECTIVE: The student will learn how to set up, maintain, and store computer equipment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: This is intended as a resource sheet for the teacher. It could possibly be used at the high school level in specific word processing or information processing classes.

Ergonomics is the study of the interaction of people and machines within the office environment. This "resource unit" is just a beginning document that would introduce the teacher to the subject.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES: Word Processing Information Systems, Chapter 5, "Ergonomics", pages 128-133, by Marilyn Popyk, published by Gregg McGraw-Hill.

ERGONOMICS

Ergonomics is the study of people and machines interacting within their environment. Such things as the "fit" of person to machine, the readability of the machine by the person using it, and the overall ease with which a person can use a machine are all part of the study of ergonomics. Why is this important to me as a teacher of computer literacy?

If anyone spends more than four or five hours at a time working on/with a CRT, the recommendations of ergonomic experts are appropriate for you. Western European nations have already instituted industry standards for CRT specifications and usage. The United States has been slower to respond to potential health hazard studies; however, the Oregon Senate has a bill before it to implement some of these recommendations.

A 1981 study of "Potential Health Hazards of Video Display Terminals," by the National Institute for Occupational Safety and Health, makes several recommendations that carry no legal or regulatory force, but serves as guidelines for designers and manufacturers. Here are some of those recommendations:

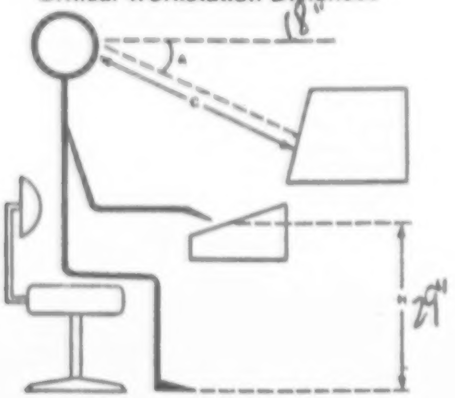
** The ideal lighting level for CRT operation is about one-third to one-half that needed for hard copy reading. Therefore, dimming the lights would increase the readability of the screens.

** Steps should be taken to reduce glare on CRT's. Hoods or filters, as well as careful placement of the screen, (away from windows and direct lighting) help ease eyestrain.

** The height and distance of the terminal and keyboard are important factors to help reduce back, neck and shoulder problems of CRT users. (Please see the diagram below for the proper distance and height.) Screens and keyboards should be split to provide the best distance and height.

These are just a few of the NIOSH recommendations. For further information, please see a copy of that 1981 study.

Critical Workstation Distances



A—Viewing angle, from horizontal
C—Viewing distance
H—Height of keyboard home row

7.1.1
Reference No.

ACTIVITY TITLE: Set Up, Store, And Maintain Evaluation

OBJECTIVE: The student will learn how to set up, maintain, and store computer equipment.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: The teacher will demonstrate and discuss the correct way to set up the computer and printer. Then, the student will perform the correct steps in computer and printer set up and shut down.

MATERIALS REQUIRED: Computer
Student evaluation form
Operating manual for computer

ADDITIONAL RESOURCES:

Key to Section III of the evaluation form:

1. F -- Dirt, food or spillage can damage the equipment.
2. F -- It wastes electricity.
3. T -- The media is magnetically coded and it could destroy the encoding.
4. T -- The feeding mechanism could be damaged.
5. T -- It could be a shocking experience! Also, some circuits could be damaged or loosened.

EVALUATION FORM
Set Up And Maintenance Of Computer Equipment

I. The student is able to (circle the correct response)

Yes No 1. put a disk in the disk drive.

Yes No 2. attach computer to monitor.

Yes No 3. turn on the computer.

Yes No 4. turn on the monitor.

Yes No 5. adjust the monitor.

Yes No 6. turn off the monitor and computer.

II. If a printer is available, the student should be able to:

Yes No 1. thread paper into printer.

Yes No 2. turn on the printer.

Yes No 3. adjust the paper.

Yes No 4. clear the paper from the printer.
use the Form feed
use the Line feed
remove the document

Yes No 5. turn off the printer.

III. True or False

____1. It is O.K. to eat your lunch at the computer.

____2. The computer should be left on when not in use.

____3. Magnets can damage the computer and the storage media.

____4. Paper in the printer should not be adjusted while the printer is running.

____5. The computer should not be opened without the permission of the teacher.

IV. Essay Question

You are the first one to use the computer in the morning. List in order all the things you would do to start the computer and printer.

7.2.1
Reference No.

ACTIVITY TITLE: Dos And Don'ts

OBJECTIVE: The student will describe and demonstrate proper care of storage media.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*			

DESCRIPTION: The student will look at each picture and decide which demonstrate proper care of media. The student will cross out each incorrect picture.

MATERIALS REQUIRED: Students duplicated sheet
Pencils

ADDITIONAL RESOURCES:

Answers: The following pictures are incorrect and should be crossed out.

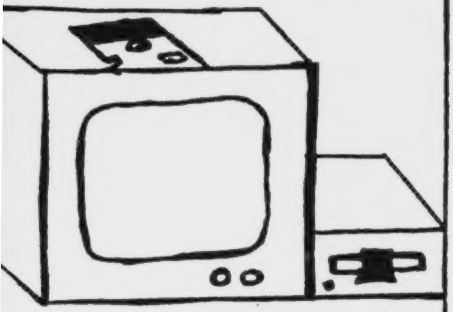
A, B, C, D, E, F, G, H, I, K, L, N

7.2.1

Name ______________________________

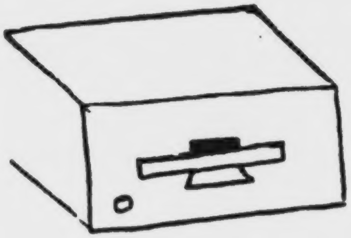
DOS AND DON'TS

Cross out the pictures which show mistakes in the care of the computer.



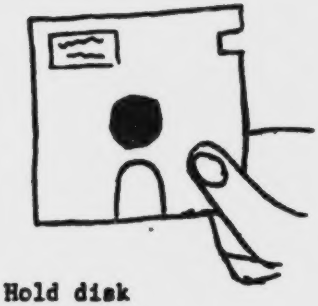
Place disk on T.V. or disk drive.

A



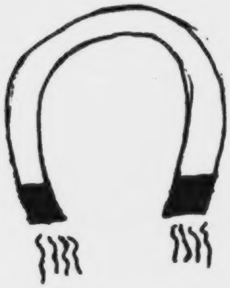
Leave disk drive with door open.

B



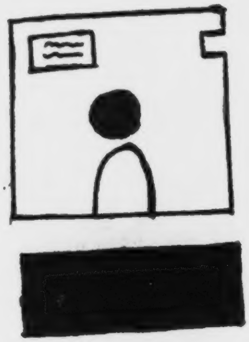
Hold disk by corner

C



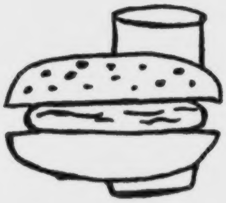
Bring magnets close to disks

D



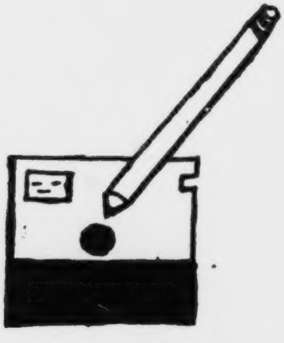
Leave disk out of jacket

E

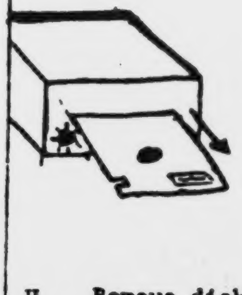


You can eat by a disk

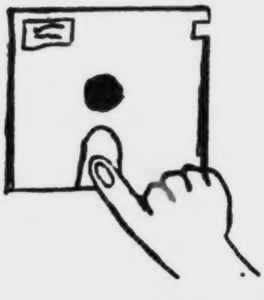
F



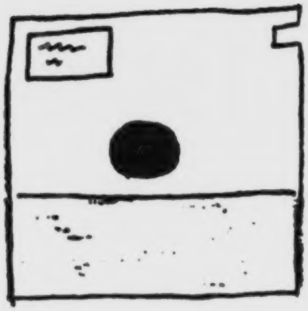
G Write on disks



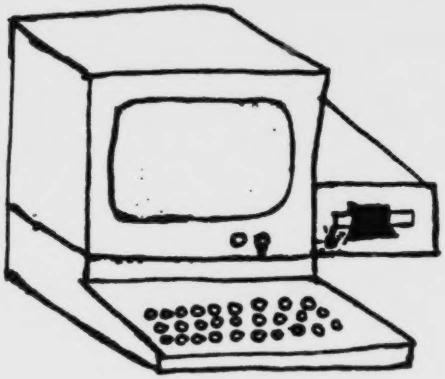
H Remove disk with light on.



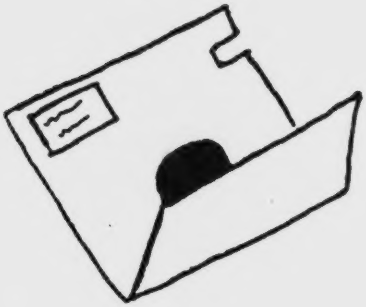
I You may touch the oval part of the disk



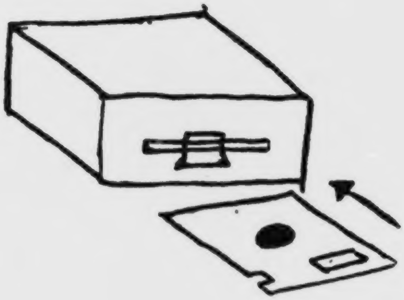
Store disk in cover.



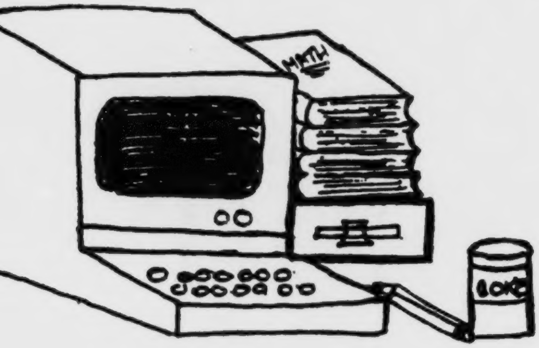
You can press the keys when the disk
K light is on.



Disks can be bent



M Insert disk flat



Clean area around the computer.

7.2.2
Reference No.

ACTIVITY TITLE: Microcomputer Operator's License

OBJECTIVE: The student will describe and demonstrate proper care of storage media.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	*

DESCRIPTION: When the students demonstrate on the checklist or test or both that they know how to care for the storage media and how to begin operation, load and run a program and how to end operation, they will be awarded a computer operator s license. Other activities from 7.2, 7.3, and 7.5 may be useful. Some things on the checklist or test may not apply to your machine. For K-3, use the check-off sheet in 7.2.2 for the instructor to check-off each student. For a student activity see 7.3.1 and 7.3.5.

MATERIALS REQUIRED: Computer
Software or storage media
Checklist

ADDITIONAL RESOURCES:

Answer key:
1. T
2. F
3. T
4. A
5. C
6. B
7. C
8. A

1. Put the disk in the drive
2. Turn system on
3. Type catalog
4. Choose program
5. Type run and program name
6. Wait for title
7. Follow directions given

Short answer question: Nothing, until the red light goes off.

NAME ______________________________________ ROOM ____________

COMPUTER TEST
FOR APPLE

I. Computer Care. Circle the correct answer on the left.

True False 1. You can damage the disk if you touch it with your fingers.

True False 2. You should store the disk on top of the TV when you are not using the disk.

True False 3. You should not do anything when the computer's red light is on.

II. Computer Use. Write the letter of the correct answer in the space to the left.

____________ 4. When you want to use the computer you should

A. put in the disk and turn on the computer
B. turn on the computer and put in the disk

____________ 5. After the title of the disk has appeared on the screen what, word should you type to bring up the list of programs contained on the disk?

A. PROGRAM B. CARD CATALOG
C. CATALOG

____________ 6. When you wish to use the program LEMONADE you should type

A. LEMONADE B. RUN LEMONADE
C. PLAY LEMONADE

____________ 7. The list of instructions that makes things appear on the screen is called a

A. GRAPHIC B. PLOT
C. PROGRAM

____________ 8. The blinking square on the machine tells you

A. The computer is waiting for you to do something
B. The computer is broken
C. The computer is about to do something

From: Central School District 13J.

III. Put the following directions in the correct order. Write the answer below:

CHOOSE PROGRAM 1. ______________________________

TURN SYSTEM ON 2. ______________________________

WAIT FOR TITLE 3. ______________________________

PUT DISK IN THE DRIVE 4. ______________________________

TYPE RUN AND PROGRAM NAME 5. ______________________________

FOLLOW DIRECTIONS GIVEN 6. ______________________________

TYPE CATALOG 7. ______________________________

IV. What should you do if the red light on the disk drive is lit? _____

____

COMPUTER LEARNER'S PERMIT COMPETENCIES

AVOID TOUCHING TAPE OR DISK SURFACES

KEEP DISKS OR TAPES AWAY FROM SCREEN

WAIT UNTIL THE RED LIGHT ON THE COMPUTER IS OUT BEFORE DOING ANYTHING

OPERATE THE COMPUTER ONLY WHEN YOU HAVE PERMISSION FROM AN ADULT OR THE STUDENT COMPUTER MANAGER

HAVE FUN AND LEARN

COMPUTER OPERATOR'S LICENSE COMPETENCIES

1. Put the disk in the drive.
2. Turn on the system by using the main power switch.
3. Wait for the title of the disk to appear on the TV screen.
4. Type the word CATALOG.
5. Choose the program you wish to use.
6. Type RUN and the program name.
7. Wait for the program directions (the red light will be on for a little while).
8. Follow the directions that the program gives you.

THIS CERTIFIES THAT

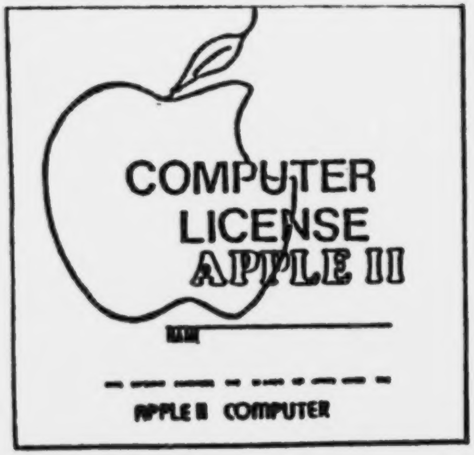
____

HAS REACHED ____ LEVEL

OF BEGININNING

COMPUTER

PROGRAMMING



COMPUTER
LICENSE
APPLE II

____

APPLE II COMPUTER

7.2.2

Name ______________________________

Check list for computer operator's license.

YES NO

_____ _____ 1. Demonstrate proper care of storage media.

_____ _____ 2. Find switch and turn on computer.

_____ _____ 3. Find switch and turn on monitor or TV.

_____ _____ 4. Load disk drive or tape player.

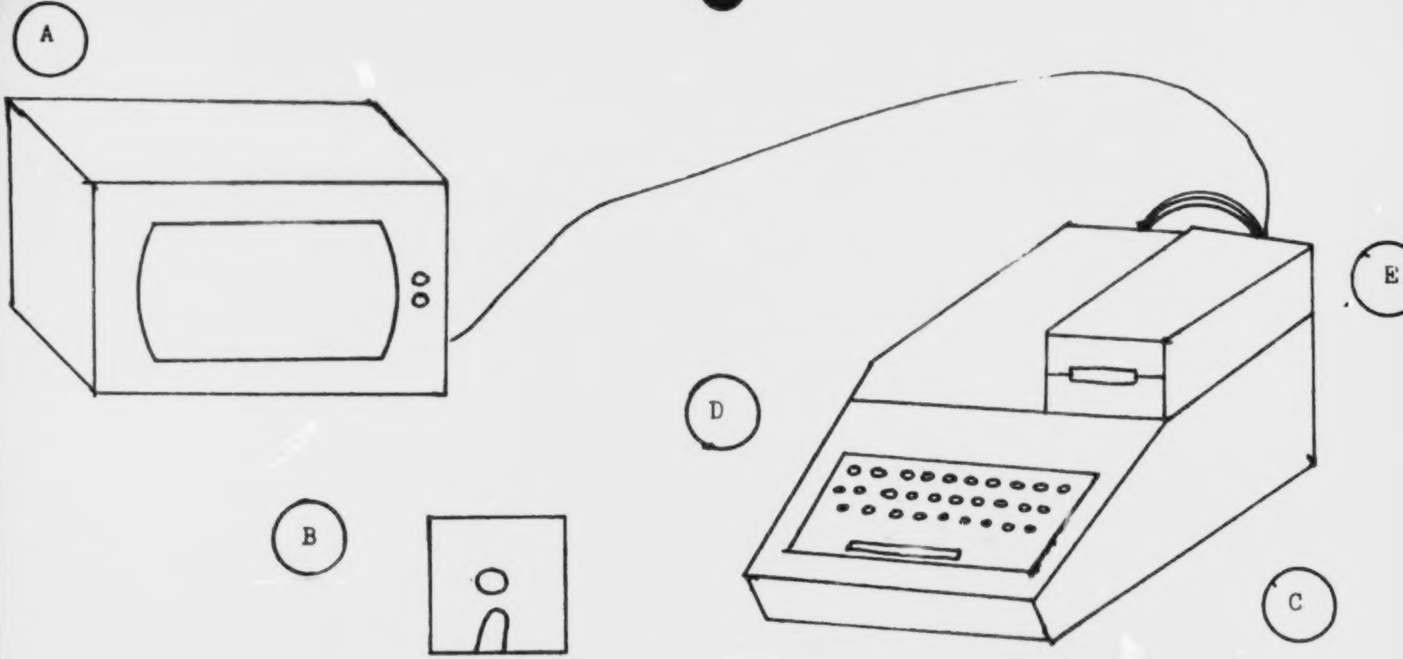
_____ _____ 5. Load and run a program.

_____ _____ 6. Turn off monitor of TV.

_____ _____ 7. Turn off computer.

_____ _____ Recommended for operator's license.

Signed ______________________________



LABEL THE PARTS.

________ COMPUTER

________ DISK

________ KEYBOARD

________ MONITOR

________ DISK DRIVE

7.2.3
Reference No.

ACTIVITY TITLE: Care Of Storage Media Crossout

OBJECTIVE: The student will demonstrate proper care of storage media.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	

DESCRIPTION: The student colors the areas of a puzzle which contain descriptions of the proper care of computers and storage media.

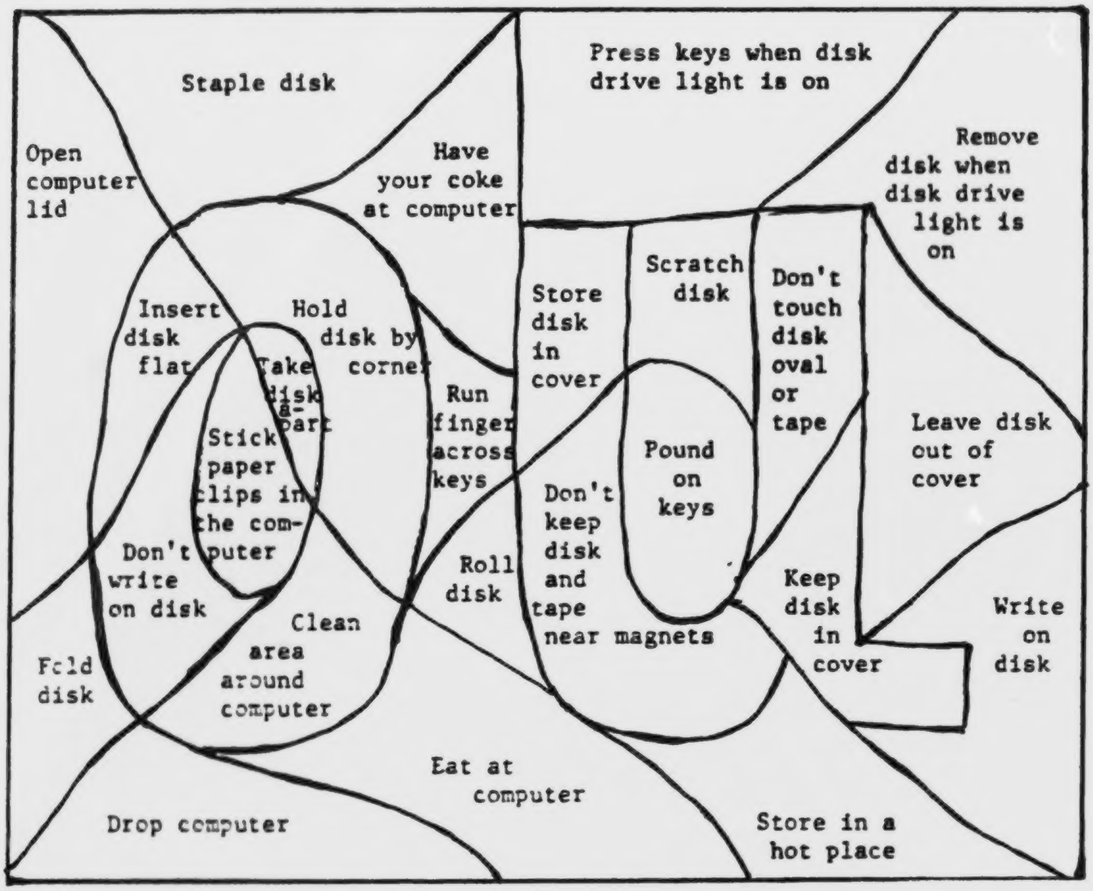
MATERIALS REQUIRED: Worksheet
Crayons or colored pencils

ADDITIONAL RESOURCES:

Name ______________________________

CARE OF STORAGE MEDIA CROSSOUT

Color the areas which contain descriptions of proper handling of the computer and storage media.


Staple disk
Press keys when disk drive light is on
Open computer lid
Have your coke at computer
Remove disk when disk drive light is on
Insert disk flat
Hold disk by corner
Take disk apart
Stick paper clips in the computer
Run finger across keys
Store disk in cover
Scratch disk
Don't touch disk oval or tape
Pound on keys
Leave disk out of cover
Don't keep disk and tape near magnets
Don't write on disk
Roll disk
Keep disk in cover
Write on disk
Fold disk
Clean area around computer
Eat at computer
Drop computer
Store in a hot place

Turn paper upside down to see what to do with the descriptions that are left.

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7.2.4
Reference No.

ACTIVITY TITLE: Care Of Storage Media

OBJECTIVE: The student will demonstrate proper care of storage media.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: The students will show they know how to care for the storage media by correctly completing the true/false worksheet.

MATERIALS REQUIRED: Worksheet

ADDITIONAL RESOURCES:

Answer key:

1.	F	8.	F
2.	F	9.	F
3.	F	10.	T
4.	T	11.	T
5.	F	12.	F
6.	T	13.	F
7.	F	14.	F
		15.	T

7.2.4

Name ____________________________

CARE OF STORAGE MEDIA

Circle T (true) or F (false) for each of the following. For proper care of the computer and storage media, you should:

T F 1. Remove disk with disk drive light on.

T F 2. Lay disk or tape on TV or monitor.

T F 3. Eat at the computer.

T F 4. Hold the disk by the corner.

T F 5. Type on keyboard with disk drive light on.

T F 6. Write on the disk.

T F 7. Keep magnets near the computer.

T F 8. Touch tape or oval on disk.

T F 9. Fold and crumple disk.

T F 10. Store the disk in its cover.

T F 11. Have a clean area around the computer.

T F 12. Explore the inside of the computer.

T F 13. Staple paper to a disk.

T F 14. Scratch disk or tape.

T F 15. Insert disk flat.

7.3.1
Reference No.

ACTIVITY TITLE: Operating Your Computer (Primary Level)

OBJECTIVE: The student will demonstrate how to begin operation, load and run a program, and end operation.

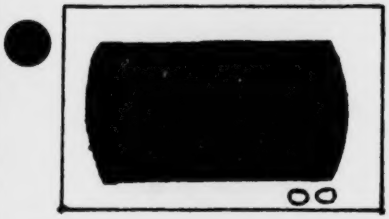
GRADE LEVELS:	K-3	4-6	7-8	9-12
	*			

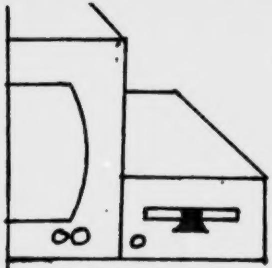
DESCRIPTION: The student will cut the activity sheet into individual pictures and arrange the tasks necessary for operating the computer in chronological order.

MATERIALS REQUIRED: Students worksheets duplicated
Scissors

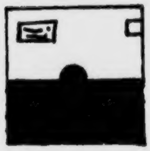
ADDITIONAL RESOURCES: Manuals specific to your computer and student grade level. Section 7.2.2, Operator's License.

TURN
MONITOR
OFF



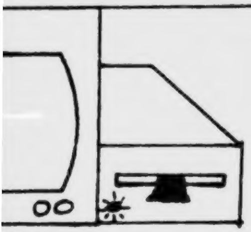


CLOSE DISK DRIVE DOOR.

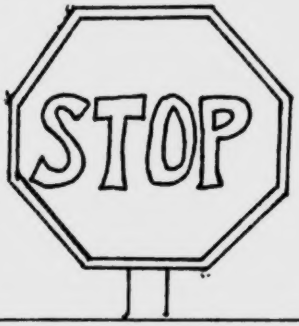


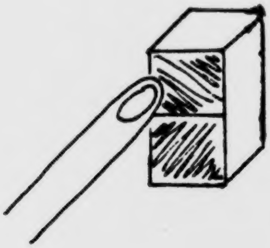
7.3.1

PUT DISK IN DUST COVER.

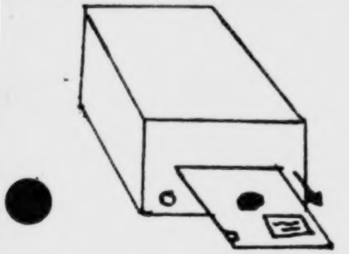


WAIT UNTIL DISK DRIVE
LIGHT GOES OFF.

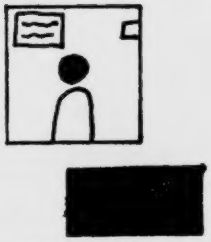




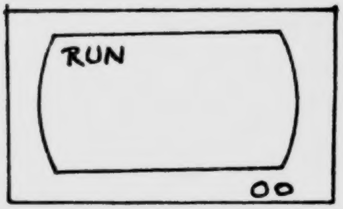
TURN COMPUTER ON.

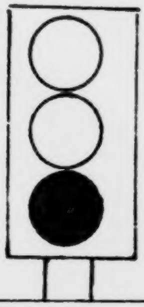


TAKE DISK FROM THE DISK DRIVE.

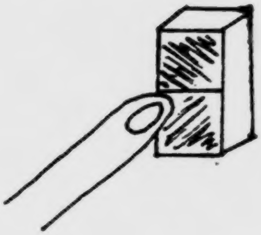


TAKE DISK OUT OF DUST COVER.

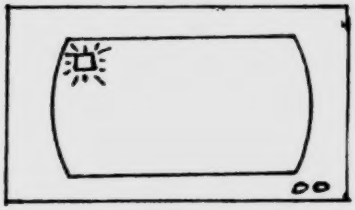




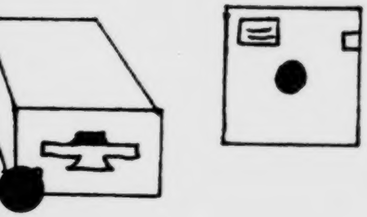
START



TURN COMPUTER OFF.



TURN MONITOR ON.



PUT DISK IN DISK DRIVE.

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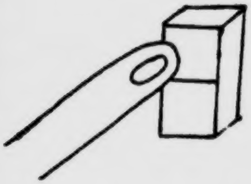
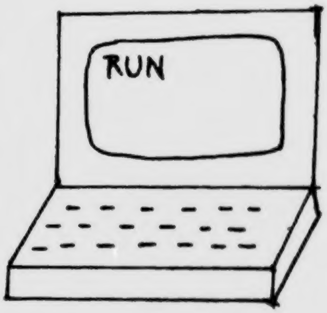
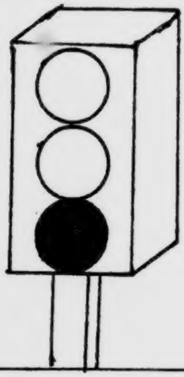
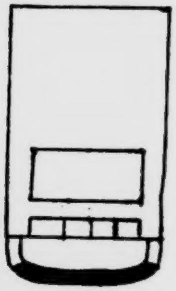


TURN COMPUTER ON.

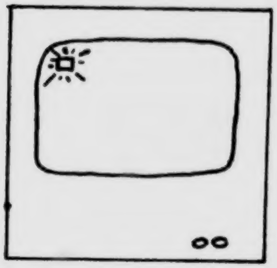




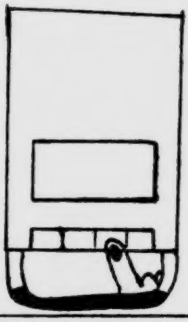
START



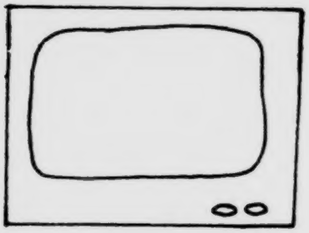
TAKE
CASSETTE
FROM
TAPE
PLAYER



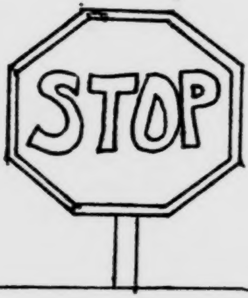
TURN
MONITOR
ON

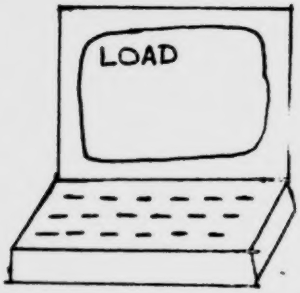


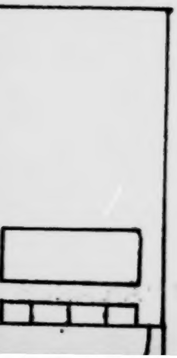
PRESS
PLAY
BUTTON



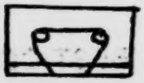
TURN MONITOR OFF.

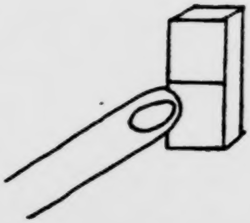






PUT
CASSETTE
IN
TAPE
PLAYER





TURN COMPUTER OFF.

403

7.3.2
Reference No.

ACTIVITY TITLE: Operating Your Computer

OBJECTIVE: The student will describe and demonstrate proper care of storage media.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	

DESCRIPTION: The students cut the activity sheet and arrange the tasks necessary for operating the computer in chronological order.

MATERIALS REQUIRED: Student activity worksheets
Scissors

ADDITIONAL RESOURCES: Manuals specific to your computer and student grade level.

COMPUTER WITH DISK DRIVE

7.3.2

PUT DISK IN DISK DRIVE	TURN COMPUTER ON	TAKE DISK FROM DUST COVER
START	TURN OFF COMPUTER	TURN OFF MONITOR
PUT DISK IN DUST COVER	TURN ON MONITOR	STOP
RUN PROGRAM	CLOSE DISK DRIVE DOOR	TAKE DISK FROM DISK DRIVE
WAIT UNTIL DISK DRIVE LIGHT GOES OFF		

COMPUTER WITH CASSETTE

7.3.2

PUT CASSETTE IN TAPE PLAYER	TURN ON COMPUTER	TAKE CASSETTE FROM TAPE PLAYER
START	TURN OFF COMPUTER	TURN OFF MONITOR
LOAD PROGRAM	TURN ON MONITOR	STOP
RUN PROGRAM	PRESS PLAY BUTTON	

7.3.3
Reference No.

ACTIVITY TITLE: Log-On Sequence

OBJECTIVE: The student will demonstrate how to begin operation, load and run programs, and end operation.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: After a teacher demonstration, the student will number the steps for logging on the terminal sequentially. Separate worksheets are provided for Apple, PET, and a terminal operation.

MATERIALS REQUIRED: Student worksheets for appropriate machine

ADDITIONAL RESOURCES: Operating manuals for computers.

Key to Apple worksheet:	Key to PET:	Key to Terminal:
2	*8	4
4	4, LOAD "Program Name"	8, RUN, NAME, ACCT. NO.
1	3	5
9	*2	*1
10	*1	3
12	5	*12
8, RUN (Program Name)	*9	6
3	6, stops, READY	7
11	7, RUN	*13
6		*11
7, CATALOG		9, CONTROL C
5		10, BYE
		*2

*Special Note: There are places where variation of order can occur. Where variation occurs, there is no significant difference for the order. This should be discussed with students.

LOG-IN SEQUENCE

For Apple Operation

Put the following statements in the order that they should be performed. Put a "1" by the first thing to do, a "2" on the second, and so on.

Put the disk in the disk drive.

Turn on the computer.

Take the disk from the dust cover.

Turn off the computer.

Turn off the monitor.

Put the disk in the dust cover.

Run the program. To run the program, type ____________________.

Close the disk drive door.

Take the disk from the disk drive.

Wait until the red light on the disk drive goes off.

See what is on the disk. To do this, type ____________________.

Turn on the monitor.

LOG-IN SEQUENCE

For PET Operation

Put the following statements in the order that they should be performed. Put a "1" by the first thing to do, a "2" on the second, and so on.

Take the tape from the tape player.

Load the program. To do this, type ________________.

Rewind the tape.

Turn on the computer.

Put the tape in the tape player.

Start the tape.

Turn off the computer.

Wait for the tape player to finish. You know the tape is finished when ______________________________.

Run the program. To do this, type __________________.

7.3.3

LOG-IN SEQUENCE

For Terminal Operation

Put the following statements in the order that they should be performed. Put a "1" by the first thing to do, a "2" on the second, and so on.

Put the receiver in the coupler.

Run a program. To do this, type ____________________.

Type in your account number. My account number is _____________.

Turn on the terminal.

Dial the telephone. The number is ___________________.

Turn off the modem.

Type in your password. Do you know your password? DO NOT WRITE YOUR PASSWORD HERE!!!!

See what choices you have to run. To do this, type ____________.

Put the receiver back on the telephone.

Turn off the terminal.

Stop the run of the program. To do this, type _______________.

Log off. To do this, type __________________________.

Turn on the modem.

7.3.4
Reference No.

ACTIVITY TITLE: PET Computer Command Crossword

OBJECTIVE: The student will demonstrate how to begin operation, load and run programs, and end operation.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	

DESCRIPTION: A crossword puzzle using terms that will be utilized in the loading, operation, and storage of programs. This activity is PET specific.

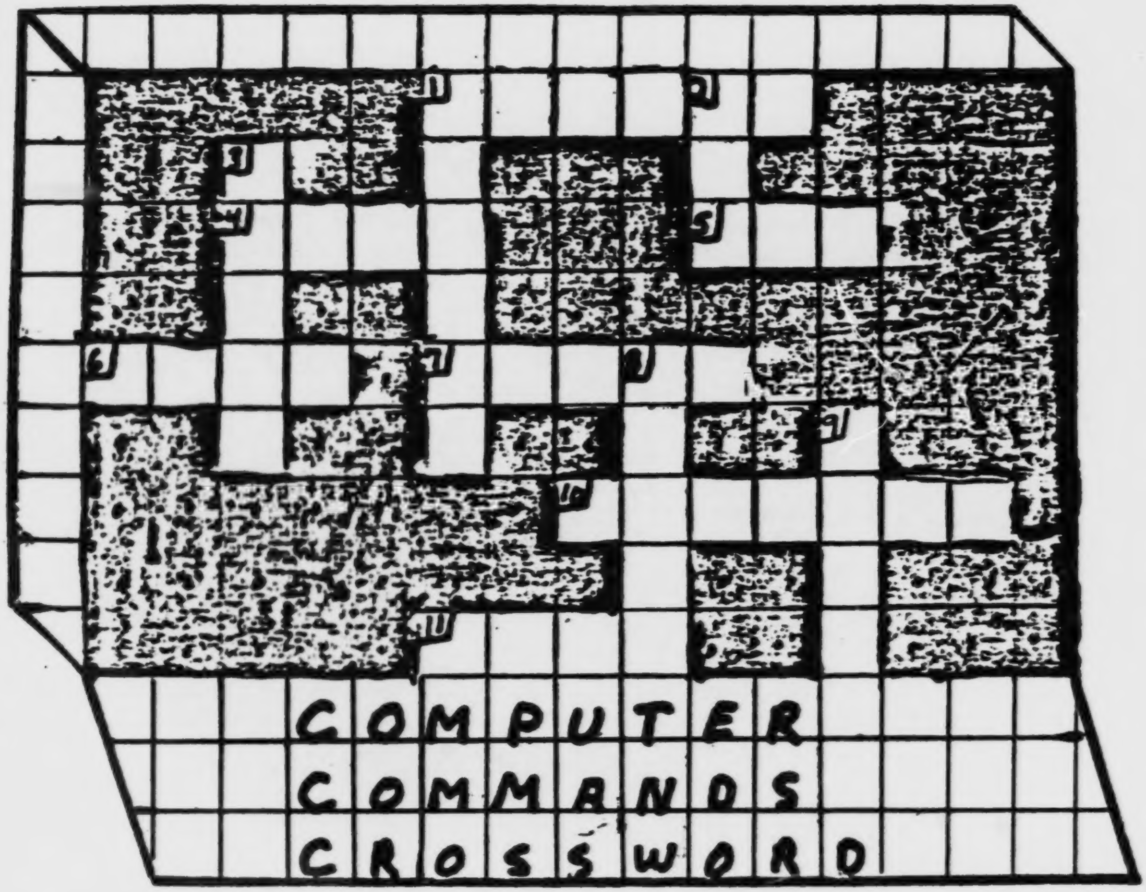
MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

Answer key:

1. Record
4. List
5. New
6. Load
7. Ready
10. Catalog
11. Save

1. Return
2. Run
3. DLOAD
8. DSAVE
9. Play



ACROSS:

1. Press this cassette button to store a program.
4. This command tells the computer to display the steps of the program.
5. This word erases a program from the computer's memory.
6. This puts a cassette program into the computer's memory.
7. A signal that the computer is ready to begin the program.
10. To ask the computer to display available programs.
11. Command to computer to store a program on a cassette.

DOWN:

1. Press this key after typing a command.
2. Tell the computer to start a program.
3. To transfer a disk program into the computer.
8. To store a computer program on a disk.
9. Cassette key pressed to load programs

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7.3.5
Reference No.

ACTIVITY TITLE: Describe How To Use Your Computer

OBJECTIVE: The student will demonstrate how to begin operation, load and run programs, and end operation.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: The teacher demonstrates and discusses the use of special function keys. The student will then describe how to use those keys. See related activity 7.6.1.

MATERIALS REQUIRED: Worksheet

ADDITIONAL RESOURCES: Computer Operating Manual

See section 7.2.2, Operator's License

Name ____________________________

DESCRIBE HOW TO USE YOUR COMPUTER

Describe how to do each of the following on your computer.

1. Move the cursor
    a) Up
    b) Down
    c) Left
    d) Right

2. Stop the run of a program

3. Clear the screen

4. Clear memory

5. Save the program in storage

6. Erase the program in storage

7. Protect a program in storage

8. See a copy of the program

9. Run a program

10. Load a saved program and run it

11. Correct a spelling error

12. Erase a word

13. See a copy of part of a program

14. Insert a character

7.4.1
Reference No.

ACTIVITY TITLE: Oops! What Happened?

OBJECTIVE: The student will demonstrate recognition of errors in interacting with computers and is able to correct them.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: The students will problem solve situations which arise during interaction with the computer. This could be done orally, either individually or in groups, or in writing.

MATERIALS REQUIRED: Machine manuals
Student activity worksheet

ADDITIONAL RESOURCES:

OOPS! WHAT HAPPENED?

Tell what you would do in each of the following. There might be several things to check before you find a solution.

1. What if you typed information into the computer and nothing happened?

2. What if you typed your name incorrectly?

3. What if you are running a program and suddenly your computer:

    a) Says READY (PET, TRS 80, OSI)

    B) Gives a prompt (>]) and cursor (Apple)?

4. How do you make a program stop running?

5. What do you do if you get a "SYNTAX ERROR"?

6. What if the disk drive spins forever......?

7. What happens if the disk drive doesn't go on?

7.4.2
Reference No.

ACTIVITY TITLE: Computer Trouble Shooter

OBJECTIVE: The student will demonstrate recognition of errors in interacting with computers and is able to correct them.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*		

DESCRIPTION: The teacher will set up a problem situation on a computer and present it to students. Students will then discuss and experiment with possible solutions. Solutions to situations can then be developed to provide a guide to using the computer.

MATERIALS REQUIRED: Computer trouble shooter study sheet
Computer

ADDITIONAL RESOURCES: Computer manuals

COMPUTER TROUBLE SHOOTER

Directions: Set up a computer system in front of the room where all students can see it. If possible, use a large TV or monitor. For each problem below set up the computer so that the students can observe the situation and test their solutions. This exercise assumes the use of an Apple Computer, but can be adapted to fit other computer makes. Pick and choose activities appropriate for your equipment and students. Some general contact with the computer would be helpful before doing some of these activities.

1. Put a disk or cassette in the storage device (drive or recorder). Turn on the computer but not the TV or monitor. Ask the students what is wrong and why there is nothing on the computer. (Solution - turn on the TV or monitor or plug it in.)

2. Do as above but have the TV on the wrong channel or the monitor on an incorrect setting. Ask students why the computer and TV are on, but the screen does not show any action. (Solution - find the correct channel or adjustment. Emphasize these settings to students so that they can make these minor corrections. Also, be sure to remember the correct settings before making changes! This information is very important for teachers and students that are sharing equipment or are having students go to a "community" computer.)

3. Unhook the cable that connects the computer with the TV or monitor and do as in 1 above. (Solution - connect cable back up. This connection is a common problem with computer systems and one that is easily and quickly remedied.)

4. Put a disk into the disk drive with the label side down and turn on the computer. The disk drive should continue to spin until a solution is found. The red light on the drive should be lit and the screen should not show any action. Ask the students how to stop the action and then ask what caused the disk drive to continue running. (Solution - for young students the best solution to stopping the drive is to shut off the computer. Older students could use the RESET key (or Control RESET) to stop the computer. Then turn the disk over and insert properly.)

5. Type the name of a student incorrectly on the computer and ask the students how to correct it. (Solution - A number of possible solutions are available. (1) Press the RETURN key and retype the name correctly. (2) Use the arrow keys and back up to the error and retype. (3) For the advanced students the edit keys - ESC and I, J, K, and M keys - can be used.)

6. Enter the following program and commands which will put the computer into an infinite loop. Thus, the computer will run for a good while! Ask students how to stop the computer.

```
NEW

10 X=1
20 PRINT X
30 X=X+1
40 GOTO 20
50 RUN
```

(Solution - For young students the best solution would probably be to turn the computer off. More experienced students could press CONTROL and C at the same time or press the RESET button (or CONTROL-RESET on some computers.)

7. Type in a jumble of letters and numbers and press RETURN. In most cases, the computer should respond with:

```
SYNTAX ERROR
```

Ask the students why this has happened and if it is bad for the computer. (Solution - The jumble of symbols are not recognized by the computer as a command that it understands, so it responds with the error message. The error message is just the computer telling you "I don't understand what you typed." It will not damage the computer.)

7.5.1
Reference No.

ACTIVITY TITLE: Color Keyboard

OBJECTIVE: The student will demonstrate use of keyboard and special features.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	*

DESCRIPTION: The students color a keyboard according to the sample. The students make rings and put them on their fingers so the color or the ring matches the color of the key that that finger presses. The keys of the home row should be outlined in black and students need to color lightly so letters are visible.

The students then go through short exercises simulating typing on their paper keyboard. NO SPEED, JUST FINGER PLACEMENT.

Color the keys of the typewriter or computer in the same manner and practice typing.

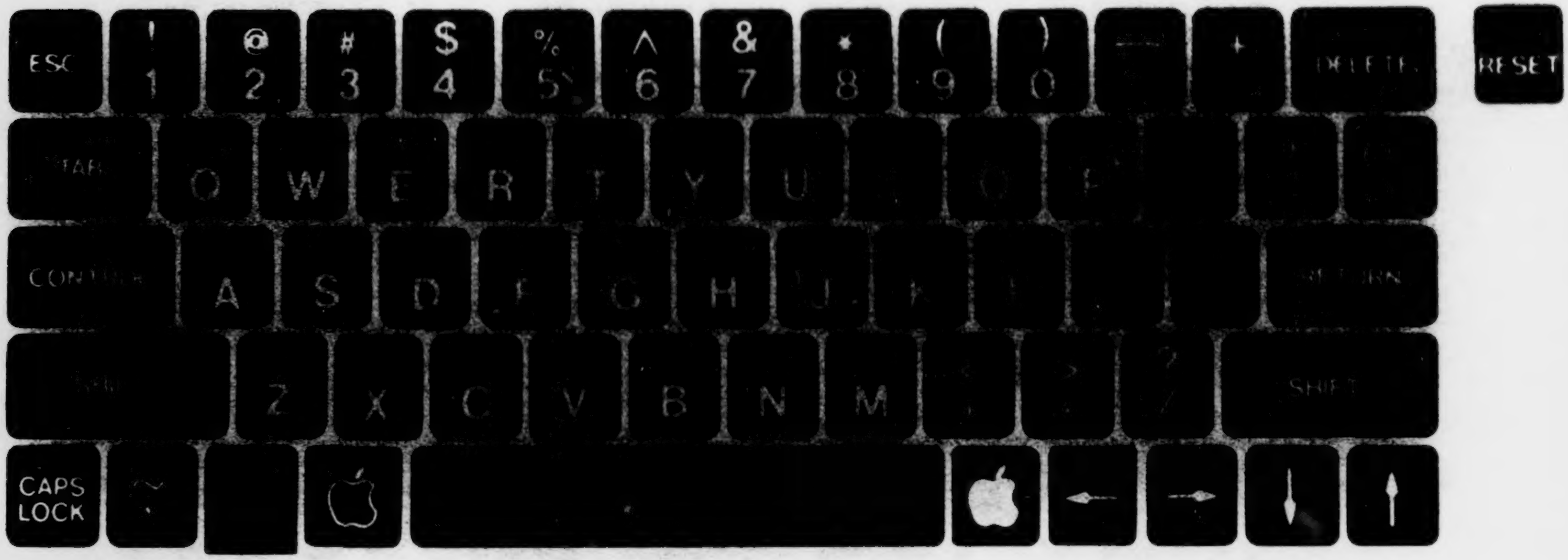
MATERIALS REQUIRED:

1. Cardboard or paper keyboard for each student.
2. Large sample keyboard or overhead transparency colored so all the keys used by the right index finger are one color (say read), all the keys used by the left index finger are another (say blue), etc.
3. Crayons and construction paper (9 colors).
4. Typewriter or computer.

ADDITIONAL RESOURCES: Related activities using keyboard reproductions are 7.5.2 and 7.7.2.

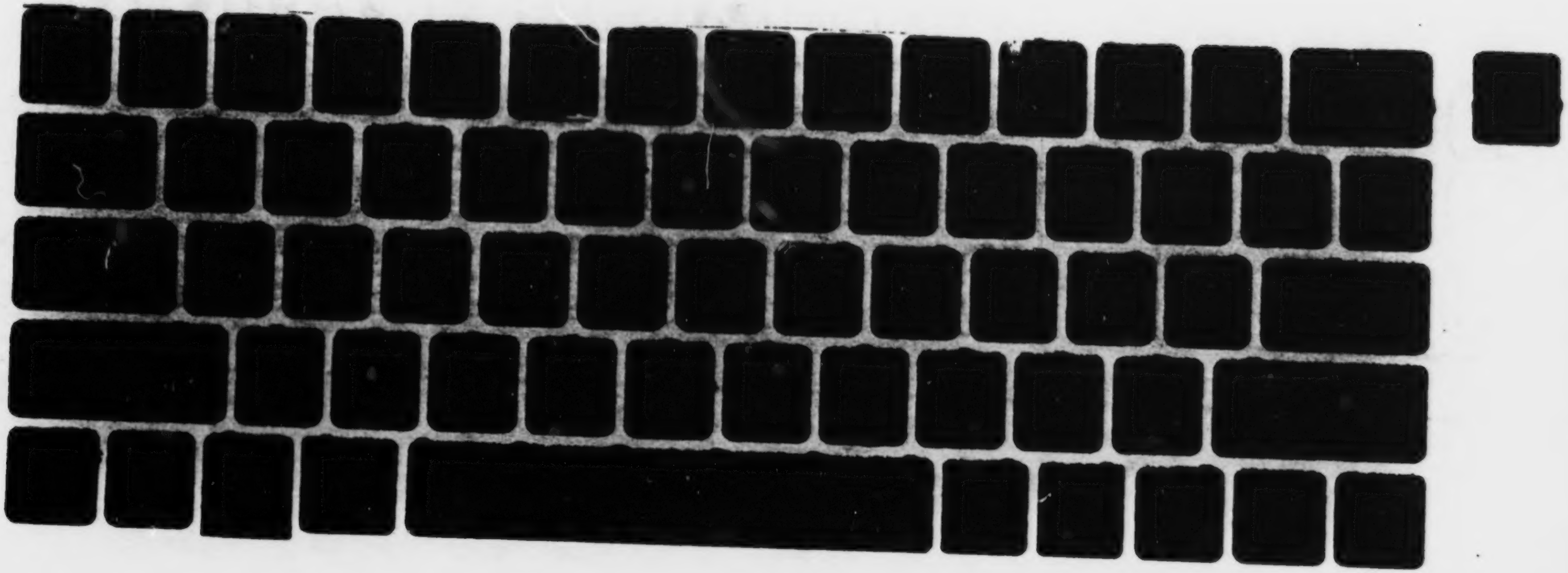
7.5.1

Apple IIe keyboard


ESC
! 1
@ 2
# 3
$ 4
% 5
^ 6
& 7
* 8
(9
) 0
DELETE
RESET
TAB
Q
W
E
R
T
Y
U
O
P
CONTROL
A
S
D
F
G
H
J
K
L
RETURN
SHIFT
Z
X
C
V
B
N
M
?
/
SHIFT
CAPS
LOCK

7.5.1

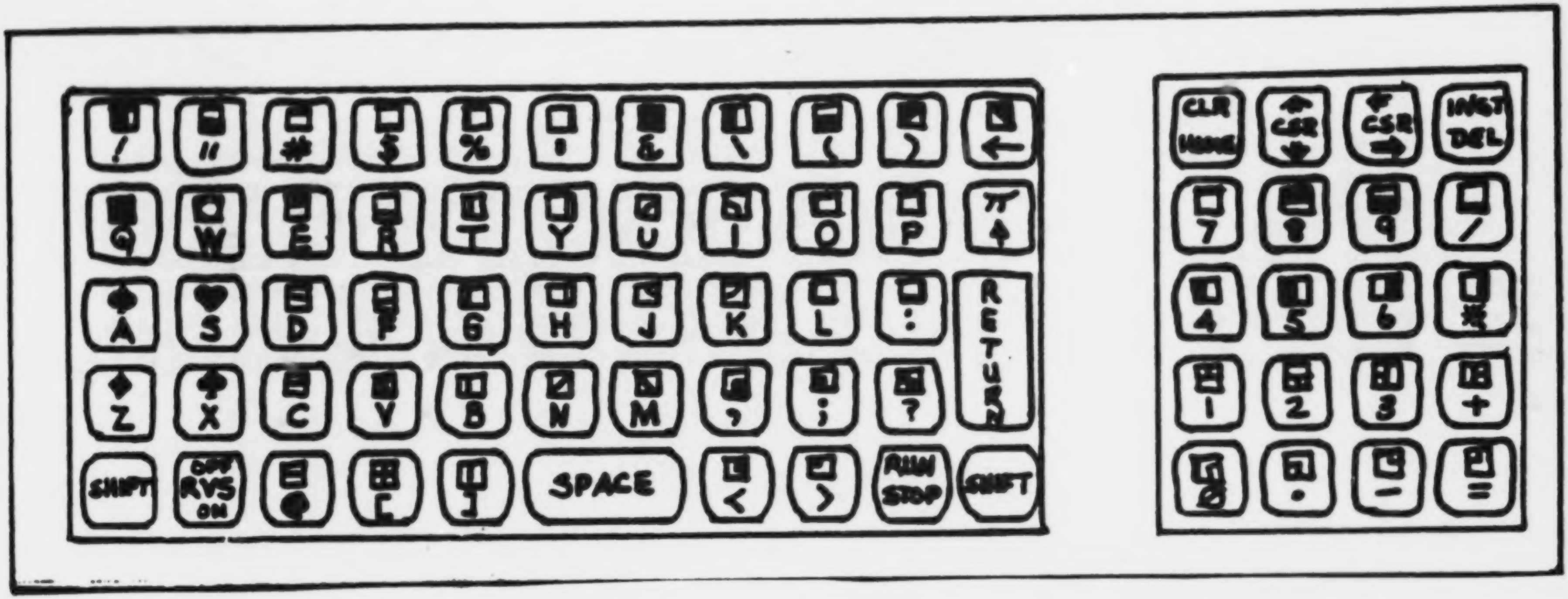
Apple IIe keyboard



423

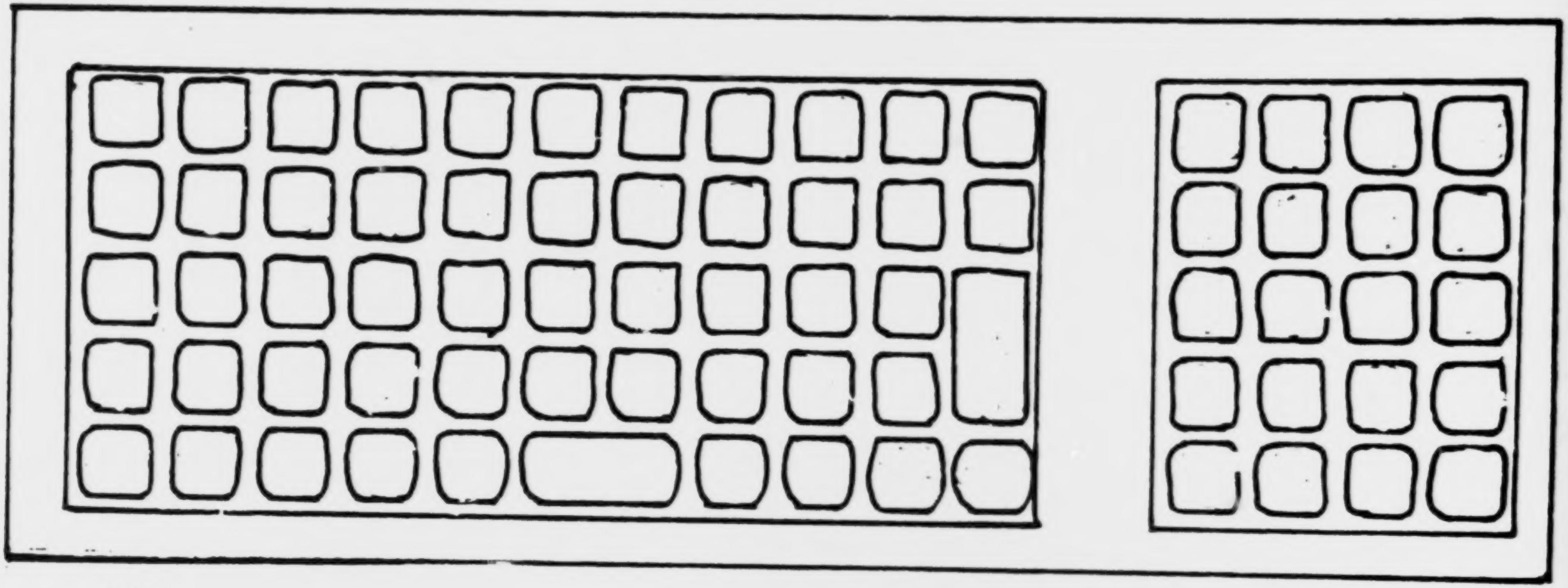
424

PET keyboard


! " # $ % ' & \ ( ) ←
Q W E R T Y U I O P π ↑
A S D F G H J K L : RETURN
Z X C V B N M , ; ?
SHIFT
OFF RVS ON
@ [ ]
SPACE
< >
RUN STOP
SHIFT
CLR HOME
↑ CSR ↓
← CSR →
INST DEL
7 8 9 /
4 5 6 *
1 2 3 +
0 . - =

PET keyboard

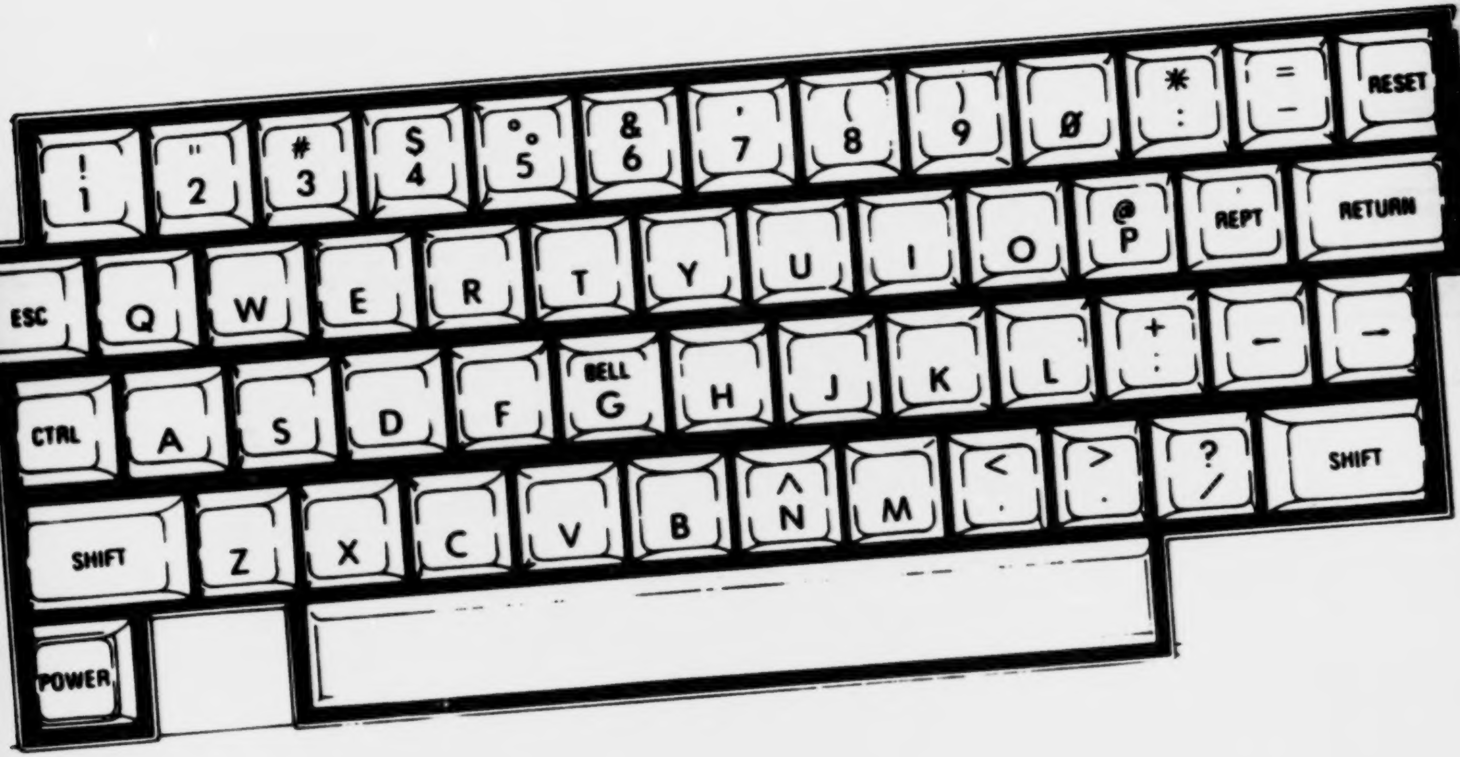
7.5.1



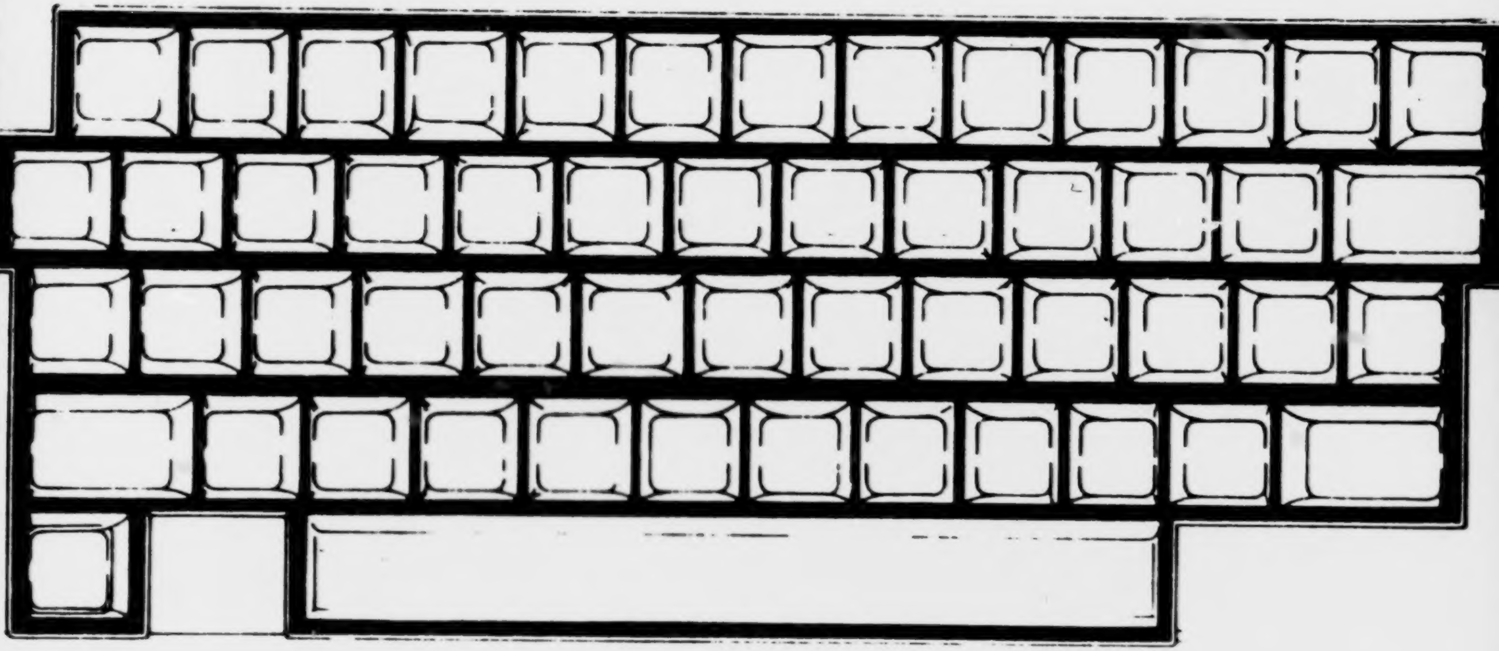
427

428

APPLE II PLUS KEYBOARD


! 1
" 2
# 3
$ 4
% 5
& 6
' 7
(8
) 9
Ø
* :
= -
RESET
ESC
Q
W
E
R
T
Y
U
I
O
@ P
REPT
RETURN
CTRL
A
S
D
F
BELL G
H
J
K
L
+ ;
←
→
SHIFT
Z
X
C
V
B
^ N
M
< ,
> .
? /
SHIFT
POWER

APPLE II PLUS KEYBOARD



7.5.2
Reference No.

ACTIVITY TITLE: Where Do The Letters Go?

OBJECTIVE: The student will demonstrate keyboarding skills using touch method.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	*

DESCRIPTION: The students will write the correct characters on the keys of a blank keyboard diagram.

MATERIALS REQUIRED: Picture of a blank keyboard for your computer

Blank keyboards for Apple II +, Apple IIe and PET are included in activity 7.5.1

ADDITIONAL RESOURCES:

7.5.3
Reference No.

ACTIVITY TITLE: Keyboard And Special Features Check Off

OBJECTIVE: The student will demonstrate use of keyboard and special features.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: As the student demonstrates understanding and use of the keyboard and special features of the computer, the evaluator/student aide will check off the skill.

MATERIALS REQUIRED: Checklist
Computer
Computer Operator's Manual

ADDITIONAL RESOURCES:

KEYBOARD AND SPECIAL FEATURES CHECK OFF

______________________________ has demonstrated s/he can:
Name

Yes	No	
______	______	1. Tell when the machine is on
______	______	2. Identify the cursor
______	______	3. Move cursor
______	______	a) Up
______	______	b) Down
______	______	c) Left
______	______	d) Right
______	______	4. Correct a typing error
______	______	5. Use shift key
______	______	6. Use space bar
______	______	7. Use RETURN or ENTER
______	______	8. Distinguish between O and 0
______	______	9. Distinguish between I, 1 and l (lower case L)
______	______	10. Stop a program

7.5.4
Reference No.

ACTIVITY TITLE: Special Keys

OBJECTIVE: The student will demonstrate use of keyboard and special features.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: The student explores the Apple Keyboard to determine what special features the keyboard has. The class discusses what they have discovered. This activity is specific for the Apple keyboard, but can be adapted to any other keyboard.

MATERIALS REQUIRED: Apple Computer
Special keys worksheet

ADDITIONAL RESOURCES: Disk - Apple Presents The Apple IIe.
Apple Presents Apple (For Apple II).

SPECIAL KEYS

1. Press some keys on your keyboard. What appears on the screen?

2. Do any of the keys cause the computer to make noise? If yes, which ones?

3. Hold down the "shift" key while you press the "M" key. What does that do? The "P" key? Try all of the other keys.

4. If your keyboard has a control (CTRL) key, hold it down while pressing other keys. Try all keys. What happened?

5. What does the long bar on the bottom of the keyboard do?

6. The flashing square on the screen is called the "cursor". Can you find a key which moves it in different directions? Which key moves it which way?

7. Type your name, then press "RETURN". If you made a mistake, could you correct it? How?

8. List anything the computer did that you would like to talk about.

7.5.5
Reference No.

ACTIVITY TITLE: Explore Arithmetic Operations And Order Of Operations

OBJECTIVE: The student will demonstrate use of keyboard and special features.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: The students work some arithmetic problems, explore some computer keys to discover how to get the computer to do arithmtic, and use the computer to check their answers to the original problems.
Discuss worksheet and emphasized order of operations. Possibly make students aware of the pneumonic device "Please Excuse My Dear Aunt Sally" which stands for (Powers, Exponents, Multiplication, Division, Addition, Subtraction).

MATERIALS REQUIRED: Computer
Explore Arithmetic Operations and Order of Operations Worksheet

ADDITIONAL RESOURCES: Math Text

EXPLORE ARITHMETIC OPERATIONS AND ORDER OF OPERATIONS

1. Work the following problems and write down your answers.

   A. 8 - 4 + 1

   B. 4 + 6 x 2

   C. 12 + 6 x 2

   D. 12 - 9 / 3

   E. 3 x 5 + 9 / 3

   F. 7 x 2

   G. 5 + 3 x 8 - 2

   H. 2 x (6 + 1) + 4 2

   I. (3 + 5) x 9 - 7

   J. (7 + 3) - (22 + 4) + 7

2. Type the following into your computer exactly as it is printed here. Be sure to press RETURN at the end of each line. Fill in the computer output.

   Output

   A. PRINT 412 + 388 __________

   B. PRINT 72 - 12 __________

   C. PRINT 9 * 7 __________

   D. PRINT 8 * 10 __________

   E. PRINT 42/6 __________

   F. PRINT 60/8 __________

   G. PRINT 5 / 2 __________

   H. PRINT 2 - 10 __________

   What does the * do? ______________________________

   What does the / do? ______________________________

   What does the + or - do? ______________________________

3. Have the compute check your answers to problem 1. Be sure to type PRINT before the problem and use the correct operation symbol in your instructions to the computer. If your answers don't agree with the computer, see if you can determine how the computer got its answer. Be sure you didn't make a typing error.

7.5.6
Reference No.

ACTIVITY TITLE: **Explore Program Editing**

OBJECTIVE: The student will demonstrate use of keyboard and special features.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: The students explore the effect of typing certain things on a program.

MATERIALS REQUIRED: Computer
Explore Program Editing Worksheet

ADDITIONAL RESOURCES:

EXPLORE PROGRAM EDITING

1. Type the following at the computer exactly as it is printed here. Be sure to press the RETURN key at the end of each line.

```
NEW
10 PRINT "HELLO"
20 PRINT "THERE"
30 PRINT "FRIEND"
40 END
```

2. Type LIST
   What did the computer do?

3. Type RUN
   What did the computer do?

4. Here are some more things to try. After each of the following, type LIST and write down what happens. Then type RUN and write the output (what is on the screen) by your copy of the LIST.

   A. Type 20 PRINT "MY"

   B. Put in extra spaces between letters and/or words.

   C. Change the punctuation marks by adding commas, periods, semicolons or by omitting quotation marks.

5. Type 20 then press RETURN. Now type LIST. Write what the computer did. Did the computer do the same thing it did the last time you typed LIST? If not, what changed?

6. Can you draw any conclusions from what you just did?
   Example: How do you erase line?

   How do you change a line of your program?

   Others?

7. Now try this sequence of commands

```
LIST
RUN
NEW
LIST
RUN
```

Can you explain what happened?

7.6.1
Reference No.

ACTIVITY TITLE: Peripheral Storage Description

OBJECTIVE: The student will demonstrate how to save, delete, and protect programs on peripherals.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: Have students follow the instructions on the activity sheet "To Save Or Not To Save?" It will allow them to discover how to SAVE a program, LOCK and UNLOCK a program, and to DELETE a program from the disk. Ideally, you would have a computer for each two or three students. It should work well, however, as a class demonstration with students filling in worksheets as they go.

MATERIALS REQUIRED: Computer

ADDITIONAL RESOURCES:

TO SAVE OR NOT TO SAVE?

Type the following program into your computer:

```
10 FOR X = 1 TO 10
20 PRINT "HELLO (your name )"
30 NEXT X
40 END
```

1. Type in CATALOG and look at the programs on the disk. Choose a name for your program that is not the same as any on the disk. Type in SAVE (program name) and hit RETURN. Describe what happens.

2. Type in CATALOG. What has been added to the CATALOG?

3. Type LOCK (program name) and hit RETURN. The disk drive will whirl and spin. When it stops type CATALOG. What is different about your program name?

4. Now type SAVE (program name). What happens?

5. Next type UNLOCK (program name). When the disk drive stops again look at the CATALOG. What has changed?

6. Type DELETE (program name). Look at the CATALOG. What has happened to your program?

7.7.1
Reference No.

ACTIVITY TITLE: Typing Fun

OBJECTIVE: The student will demonstrate keyboarding skills using the touch method.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*		

DESCRIPTION: Use the activities in the workbook Typing Fun to teach and reinforce keyboarding skills. The book could be used at a learning station.

MATERIALS REQUIRED: Typing Fun From: The Learning Works
P.O. Box 6187
Santa Barabara CA 83111

Typewriter
Paper

ADDITIONAL RESOURCES: "Typing Tutor" program from Microsoft.

"Mastertype" program from Lightning Software.

See resource section for other typing software.

ACTIVITY TITLE: Color Keyboard

OBJECTIVE: The student will demonstrate keyboarding skills using the touch method.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*	*	*

DESCRIPTION: The students color a keyboard according to the sample. The students make rings and put them on their fingers so the color or the ring matches the color of the key that the finger presses. The keys of the home row should be outlined in black and students need to color lightly so letters are visible.

The students then go through short exercises simulating typing on their paper keyboard. NO SPEED JUST FINGER PLACEMENT.

Color the keys of the typewriter or computer in the same manner and practice typing.

MATERIALS REQUIRED:

1. Cardboard or paper keyboard for each student (included in Activity 7.5.1).
2. Large sample keyboard or overhead transparency colored so all the keys used by the right index finger are one color (say red), all the keys used by the left index finger are another (say blue), etc.
3. Crayons and construction paper (9 colors).
4. Typewriter or computer.

ADDITIONAL RESOURCES: Full size reproductions of the Apple II+, Apple IIe, and PET keyboards are included in Activity 7.5.1.

7.7.3
Reference No.

ACTIVITY TITLE: Keyboarding On The Computer

OBJECTIVE: The student will demonstrate keyboarding skills using the touch method.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: This packet is not intended to supplant a regular "typing" or "keyboarding" course. The intent is to provide some instruction on touch typing.

MATERIALS REQUIRED: Computer or typewriter
The packet
Software programs (see resources) on typing if you have use of a computers

ADDITIONAL RESOURCES:

KEYBOARDING

ON

THE COMPUTER

Teaching Touch Typing

on The Apple

(or Other Machine)

Written

By

WLOCNC

(West Linn, Lake Oswego, Oregon City, North Clackamas
School Districts)

Computer Consortium

INTRODUCTION

The computer is here and has touched the very young as well. More and more young people are beginning to use the computer and need to learn how to use the keyboard. This packet will provide directions and practice in the touch typing method. The lessons were designed with the Apple Computer in mind, but could be used with any other computer or typewriter.

Three computer programs are used in conjunction with this course. The programs are not necessary and in most cases could be substituted with other programs. If you are using a computer other than an Apple, software to do the functions of the programs described below are probably available.

Program	Purpose
Typing Tutor II Microsoft Consumer Products 400 -108th Avenue NE Suite 200 Bellevue, WA 98004	This is a tutorial which also provides test paragraphs for checking typingspeed. This course uses the program as a pre- and post-test evaluation and also as additional practice.
Master Type -	Same as above.
PRACTICE	Allows the student to type on the computer without getting syntax errors and other operational error messages. Has options to clear screen and end program.

Listing:

```
 10 REM PRACTICE PROGRAM
 20 ONERR GOTO 80
 30 POKE 33,40 : NORMAL
 40 HOME
 50 VTAB 23 : PRINT "PRESS 'ESC' TO STOP PROGRAM."
 60 PRINT "PRESS CONTROL-C TO CLEAR SCREEN."
 70 VTAB 3
 80 GET A$
 90 IF ASC (A$) = 3 THEN HOME: GOTO 40 : REM CLEAR SCREEN
100 IF ASC (A$) = 27 THEN END: REM END PROGRAM
110 S = PEEK (-16336) + PEEK (-16336) + PEEK (-16336) + PEEK
      (=16336): REM SOUND FOR EACH LETTER
120 PRINT A$;
130 GOTO 80
```

Type Test -

MECC Business Disk Volume I Typing	Provides lesson by lesson feedback on typing speed. Student enters a short, one line phrase and then retypes it as the computer checks typing speed.

(Note: A listing of a similar program is provided in the resource area of this guide.)

KEYBOARDING ON THE COMPUTER

The following lessons are designed to help you:

1. Learn the positions of the letter keys.
2. Learn the positions of the , ; . " : - + keys.
3. Learn basics of typing to help increase typing speed on the computer.

Some of the resources you will use are:

1. This booklet
2. Keyboard (either a typewriter, computer, or terminal)
3. Typing Tutor (see instructor)
4. Programs, PRACTICE and TYPE TEST.

CONTENTS

Lesson 1: Pretest, space bar, return and Home keys ASDF JKL;

Lesson 2: New Keys E, O, H

Lesson 3: New Keys T, I

Lesson 4: New Keys W, R

Lesson 5: New Keys N, G

Lesson 6: New Keys U, C, P

Lesson 7: New Keys Y, X, ","

Lesson 8: New Keys M, Z

Lesson 9: New Keys B, Q, "

Lesson 10: Review

Appendix A: RECORD CHART

Appendix B: Program listing of TYPE TEST

PROCEDURE

You will have about 25 minutes to do each lesson. During that time you will have some specific assignments to complete. You will also be asked to record your speed on the RECORD CHART. If there is additional time, go back to previous lessons, practice, retake and record typing speed.

Step 1: Take pretest (Typing Tutor) - Record score.

Step 2: Do practice in lesson. Use "PRACTICE" program.

Step 3: RUN TYPE TEST program to find typing speed on the lesson - record scores.

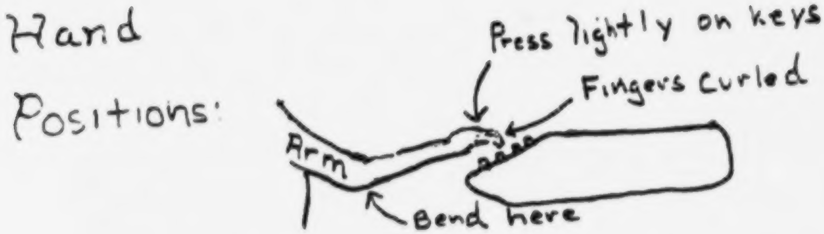
Step 4: After completing a lesson, redo past lessons and tests - Record scores.

Step 5: After completing all lessons, take post test - Record score.

Extra: If time, use "Typing Tutor" or "Mastertype" to build up your typing speed.

Lesson 1 - Space Bar, Return, Home Row

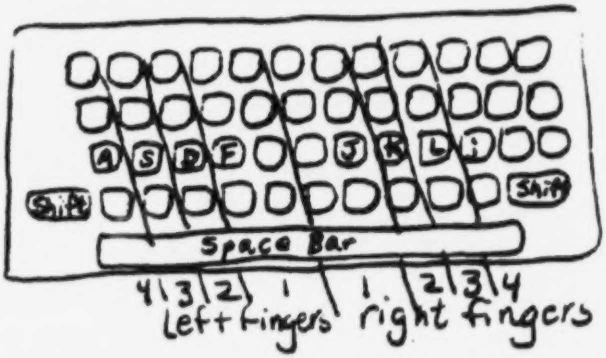
Position: Your hips should be well back in the chair, with feet flat on the floor. Shoulders should be down and relaxed with elbows at your side. The center of your body should be opposite the "J" key. The distance between your body and the keyboard should be one hand span. (Put thumb next to stomach, spread fingers - your little finger should reach the keyboard.) See drawing.



Now that you are settled, put "Typing Tutor" into the disk drive and turn on the computer and TV. Select 1 - new user - when the menu appears. Then select 3 - Test. Take the test two or three times. Record your Pretest Score on Record Chart. Back to lesson 1.

First, you will use only the four fingers of each hand in their "normal" or "home" position. Your fingers should be lightly resting on these middle row keys with right thumb hovering over space bar.

Finger Positions: Home Row



Run the program PRACTICE (listed in the Introduction). Without looking at the keys, copy the following exercise. If you make a mistake, finish the line, then type it again correctly. At the end of each line press "RETURN".

Practice striking the space bar--use your right thumb in an up and down motion: Tap once -- twice -- once -- twice -- twice -- once -- twice -- once -- RETURN

BEST COPY AVAILABLE

Lesson 1 Continued

When you reach for the RETURN, use your right little finger. Keeping the "J" finger at home, spread your fingers and use a flickering motion with the little finger. Try not to look at the keys as you "flick" your finger. Repeat the above lines a couple of times until the space bar and return feel more comfortable.

Home Row:

The left index finger controls the "F" the right index finger controls the "J".

Try these lines:

FFF FFF FF FF FF F F F FF F
JJJ JJJ JJ JJ JJ J J J JJ J

FFF JJJ FF JJ FF J F J FF J

The middle left finger controls the "D", the right middle finger the "K". Try these lines:

DDD DDD DD DD D D D D DD D
KKK KKK KK KK K K K K KK K

DDD KKK DD KK DD K D K D K

The left ring finger controls the "S", the right ring finger the "L". Try these lines:

SSS SSS SS SS S S S S SS S
LLL LLL LL LL L L L L LL L

SSS LLL SS LL S L S L SS L

The left little finger controls the "A", the right little finger the ";". Try these lines:

AAA AAA AA AA A A A A AA A
;;; ;;; ;; ;; ; ; ; ; ;; ;

AAA ;;; AA ;; A ; A ; AA ;

Lesson 1 Continued

That's the home row! Now try the same keys in a mixed up pattern.

ASDF ASDF ASDF ASDF ASDF ASDF
JKL; JKL; JKL; JKL; JKL; JKL;

A AL AK AJ S SL SK SJ D DL DK DJ
F FL FK FJ A; DK;

J JA JS JD JF K KA KS KD KF L LA LS
LD LF ; ;A AD;

;A ;A L S LS K D KD J F JF A; SL
DK FJ DK SL A; A

AS SA AL LA AK KA AJ JA AF FA SK KS FL
LF AD DA JA

Try these words:

SAD LAD DAD SALAD SKALD ADD
LASS ALDA ASK FALL ASKS ALL

JASS DADS FADS KADS KADS LAD
A SAD FALL; ADDS A FLASK;

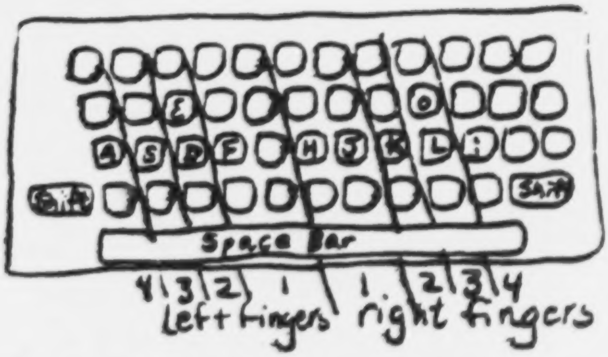
TEST SENTENCES: Run Type Test from your disk. Enter sentence 1 and type it at least three times. Enter your highest score. Repeat with sentence 2 and then record highest score.

Sentence 1: LADS FALL DADS SKALD; ALAS ALAS KLAD

Sentence 2: JASS AS FASS DAD FLAS; JALL DALK LKAS

OPTIONAL: Repeat above or work on Typing Tutor.

Lesson 2 - New Keys: E, O, H



The "H is controlled with the right index finger. Just a reach over: Look at your keys, try the reach, JHJ, when you know where the key is, try this line:

JHJ JJJ JHJ HHH JJJ JHJ HHH JJJ JHJ

Now, try these lines:

H H H HJ HJ HJ AH AH AH HA HA HA
HAD HAD HAD HJ HJ AH AH HA HA HAS
HAS HAD HAD ASH DASH DASH HALF

AH HA; HAS HAD; HAS HAD; A HALL;
A HALL; HAD HALF;

The "E" is controlled with the left middle finger. A simple reach up, while keeping the other fingers on home row. Try DED. When you know where the key is, try this line:

DDD EEE DED DDD EEE DED DDD EEE DED

Now, try these lines:

E E E ED ED ED EL EL EL LED LED
FLED FLED FLED ED ED LED LED FLED

SEE SEED DEED LEA FADE FEEL ELF SELF
SELL JELL FELL SEAL SAKE SALE SAFE

The "O" is controlled with the right ring finger. A simple reach up, while keeping the "J" and ";" fingers at home. Try LOL. When you know where the key is, try this line:

LLL OOO LOL LLL OOO LOL LLL OOO LOL

BEST COPY AVAILABLE

Lesson 2 Continued

Now, try these lines:

O O O OL OL OL DO DO DO SOD SOD
SOD SOLD SOLD OAK OAK OLD OLD SOLD

DO SO; DO SO; OF OLD; OF OLD; FOLD
OLD OAK KEEL; SHOE SALE; JELLO OLD

Try these lines with all of the letters learned so far:

HAD HAD HAS HAS ASK ASK; JAK JAK ADD
ADD HALF HALF HE HE OF OF DO DO SO SO;

SHE SHE HOE HOE JOKE JOKE HE SELLS
HE SELLS KALE; SHE SOLD JADE; AS A JOKE;

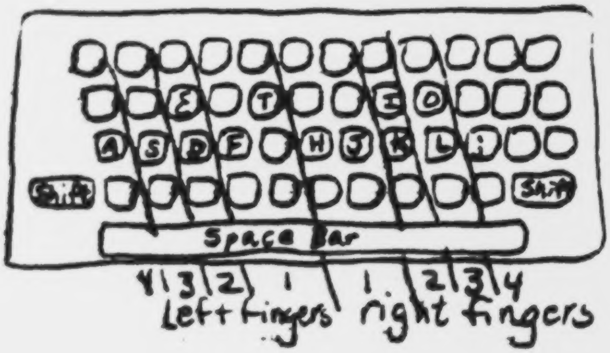
TEST SENTENCES: Run Type Test. Again, test your speed on these sentences and record your best score.

Sentence 1: SHE HAS OAK; HE HAS SOLD A HOE;

Sentence 2: A SHELF OF JELL; HAS OLD FALL JAKE;

OPTIONAL: Review Lesson 1 and retake Test Sentences. Record scores if they are better.

Lesson 3 - New Keys: T, I



The "T" is controlled with the left index finger. It's a reach up and over. Try the reach, keeping your little finger at home on the "A". FTF. When you feel you know where the key is, look away and then try these lines:

FFF TTT FTF FFF TTT FTF FFF TTT FTF

T T TF TF TF TO TO TO TOE TOE SOFT
SOFT TO TO AT AT DOT DOT LOT LOT JET

JET TAKE TAKE TALK A LOT; A LOT;
OFF THE; OFF THE; THE JET; THE JET;

The "I" is controlled with the right middle finger. It's a reach up. Try the reach KIK (Get a real "KIK" out of this one!). When you feel comfortable with the reach, look away from your keys and try these lines:

KKK III KIK KKK III KIK KKK III KIK

I I I IK IK IK IF IF IF DID DID ID
DID SAID SAID ID IS IS AID AID DIE DIE

LID LID IDLE IDLE FILE HE DID;
DID SHE; IS IDLE; IS IDLE; HAL LAKE

Practice both new letters together:

IF IF IT IT FIT FIT SIT SIT HIT HIT
THIS THIS THAT HAL IS TALL; LED SAD

JAE IS TO SEE KAE; JO LEFT THIS LEST;
HAL SAID IT IS THIS JET HE IS TO TAKE

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Lesson 3 Continued

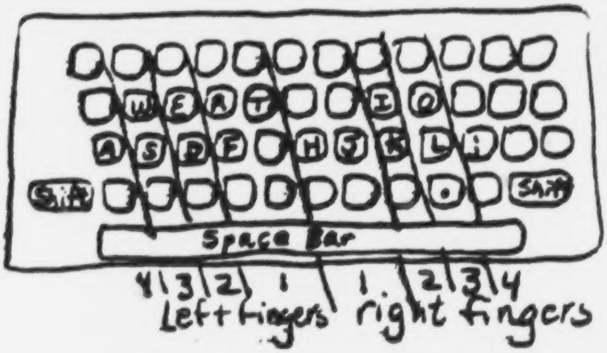
TEST SENTENCES: Run Type Test. Again, test your speed on these two sentences and record your best scores.

Sentence 1: HEIDI DID AID JAE AT THE LAKE FISH;

Sentence 2: SHE IS TO SKI AT THE LAKE THIS FALL;

OPTIONAL: Review Lesson 2 and retake test sentences. Record scores if they are better.

Lesson 4 - New Keys: , W, R and .



The "W" key is controlled with the left ring finger. It's a reach up with the "A" finger anchored at home. Try the reach, SWS. When you feel comfortable with the reach, look away, then try these lines:

SSS WWW SWS SSS WWW SWS SSS WWW SWS
W W W WS WS WS OW OW OW WOW WOW WOW

WISH WISH WS WS OW OW LOW LOW WIT
HOW WITH WITH SLOW SLOW TOW TOW

The "R" key is controlled with the left index finger. It's a reach up with the "A" finger anchored at home. Try the reach, FRF. When you feel you know where the key is, look away, then try these lines:

FFF RRR FRF FFF RRR FRF FFF RRR FRF
R R R RF RF RF OR OR OR FOR FOR FOR

RISK JERK ROD RID JAR HER HER RODE
WORK RODE FOR RISK RID HERE THERE

The "." key is controlled with the right ring finger. This is a reach down -- continue the natural curve of your finger, keeping your ";" finger anchored at home. Try the reach L.L. When you know where the key is, look away. Now, try these line:

LLL ... L .L LLL ... L.L LLL ... L.L
. . . .L .L .L ED. ED. J. O. MR. ED.

HE IS TO DO IT. HI HAS THE LIST. SR.
SOPH. FR. JR. SR. O.S.AA. C.R.T.

Try all three of the new keys together.

JAKE WROTE WK. FOR WEEK. LISA WROTE FT.
O.L. LOWE HAS WORKED FOR LT. JAROW.

JERI SAID SHE SAW THEIR SHOW. HER DAD DID.
SHE WILL DO THIS WORK IF WE ASK HER.

BEST COPY AVAILABLE

Lesson 4 Continued

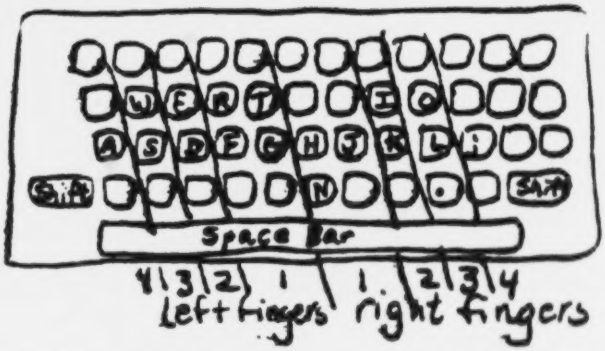
TEST SENTENCES: Same as before--Concentrate on reaching for the correct keys and keeping your eyes on the copy.

Sentence 1: A LASS HAD A FALL WITH THE SAW.

Sentence 2: JAE RODE WITH HER; JEFF DID ROW WITH HER.

OPTIONAL: Review Lesson 3, try for a more accurate score on the test sentences.

Lesson 5 - New Keys: N, G



The "N" key is controlled with the right index finger. It's a reach down and over. Look at your keys and try the reach, JNJ. When you know where the key is, look away, then try these lines.

JJJ JNJ NNN JJJ NNN JNJ JJJ NNN JNJ
N N N NJ NJ AN AN AND AND LAND LAND

AN AND LAND END LEND IN ON AN HAND
AN END; ON HAND; ONE WIN; ONE WIN;

The "G" key is controlled with the left index finger. It's a reach over from the F key. Try the reach, FGF. Look away when you know where it is.

FFF GGG FGF FFF GGG FGF FFF GGG FGF
F F F FG FG FIG FOG FAG GO GO GOT

FLAG DOG DIG RIG GOOD FIG DIG SOG
TO GO; GOTO; OR FOG; RIG IT. GOOD

Try these lines reviewing all the keys learned so far.

SI AND DOT ARE HERE; TOD AND ALI ARE NOT.
ED OL RF IK WS HJ GF NU TF; JAE FLO LT.

GO NO JOG GIN AGO LONG GONG GOTO
GO ON; SIGH IN; SIGH IN; LONG AGO;

GIGI SAW THE SKIER GO INTO THE HOTEL.
SHE AND JEAN ARE TO GO INTO THE TOWN.

ALFIE AND HE ARE TO WORK ON TOWING.
JANIS AND ANGIE ARE GOING TO L.A.

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Lesson 5 Continued

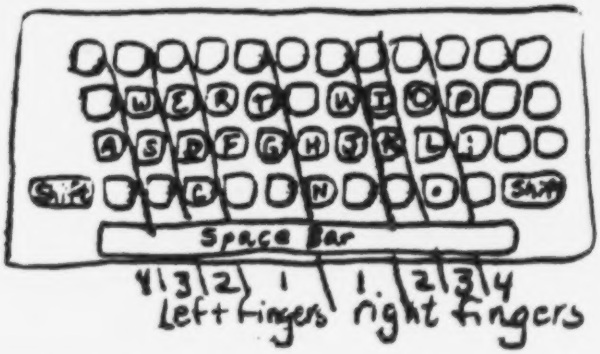
TEST SENTENCES:

Sentence 1: GIGI HAS A LIST OF WORK TO DO.

Sentence 2: JANE WAS THERE; SHE IS TO JOG.

OPTIONAL: Review Lesson 4, and try the Test Sentence again. Record your better score.

Lesson 6 - New Keys: U, C, P



The "U" is controlled with the right index finger. It's a direct reach up from the "J". Be sure to keep ";" anchored at home as you are reaching. Try JUJ. Look away when you know where the key is, then try these lines.

JJJ UUU JUJ JJJ UUU JUJ JJJ UUU JUJ
U U U UJ UJ UJ JUS US DUE DUE JUST JUST

UJ UJ US US FUR FUR SUE SUE RUG RUG RUST
A FUR; A FUR; DUE US; USED RUGS;

The "C" is controlled with the left middle finger. YES! the LEFT MIDDLE FINGER! It's a curl down with the same natural curve of your finger, be sure to keep "A" at home. Try the reach, DCD. Look at the keys, when you feel comfortable with the reach, look away and try these lines:

DDD CCC DCD DDD CCC DCD DDD CCC DCD
C C C CD CED CD COD COD COD COW COW
COT COT COT CD CD COD COD COG COD
LOCK LOCK DOCK DOCKS A COW; A COW;

A COW. A COW. THE LOCK; THE LOCK.
THE COW AT THE LOCK. THE COW AT COST.

The "P" is controlled with the "pinkie" on the right hand. Keeping "J" at home, it's a reach up. Try the reach, ;P; and when you are comfortable with the reach, try these keys:

;;; PPP ;P; ;;; PPP ;P; ;;; PPP ;P;
P P P P; P; P; PA PA PA PEN PEN PEN

KEEP KEEP KEEP P; P; PA PA PAN APT
NAP KEPT KEEP A PEN; PIE PIE PAN.

PIG PEN. APT TO KEEP; APT TO PEN PIG.

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Lesson 6 Continued

Try these lines using all three of the keys learned today.

LU HAD A CUP OF PEA SOUP; RIC HAD LUNCH.
CURTIS PUT ON SPEED TO COP THE CUP TOP.

P; WS UJ ED OL RF IK RFTF HJ GF PA US
.L CD NJ AND FAN CAN JACK CALL HACK HAND

A CASH CALL; IS DUE US; APT TO SUE;
IS UP TO US; TP KEEP IT UP; CAN CALL

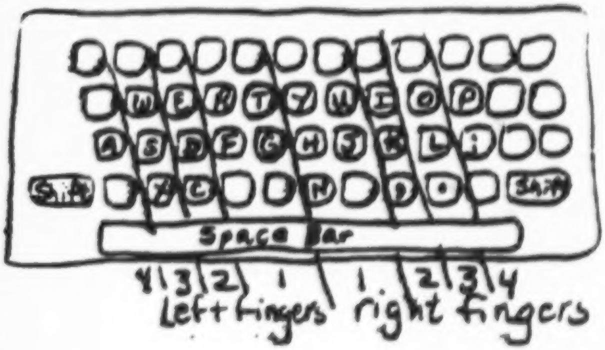
TEST SENTENCES:

Sentence 1: OUR GOAL IS TO TAKE THE PIG ON FRI.

Sentence 2: JUAN SAID THAT ALL OF US CAN HAVE PIE.

OPTIONAL: Review Lesson 5, retake the test sentences. Record your better scores.

Lesson 7 - New Keys: Y, X, and ,



The "Y" key is controlled with the right index finger. It's a reach up and over. Try the reach, JYJ. Look away when you feel comfortable with the reach. Then try these lines.

JJJ YYY JYJ JJJ YYY JYJ JJJ YYY JYJ
Y Y Y YJ YJ YJ LAY LAY PAY PAY PAY

YJ YJ JAY JAY JAY LAY LAY PAY YET
YET YES YES YOU YOU PLAY PLAYS YOU

The "X" is controlled with the left ring finger. It's a curl down with the "S" finger, while the "F" finger stays at home. Try the reach, SXS. When you know where the key is, look away, then try these lines.

SSS XXX SXS SSS XXX SXS SSS XXX SXS
X X XS XS XS OX OX OX SIX SIX SIX

SX XS SX XS OX OX AX AX FOX FOX SIX SIX
FIX FIX FLEX FLEX FLAX XRAY XRAY

FIX IT; FIX IT; A HOAX; SIX OPEN; SIX OXEN.

The "," is controlled with the right middle finger. It's a curl under with the "K" finger. Be sure to keep ";" at home. Try the reach, K,K then try these lines:

KKK ,,, K,K KKK ,,, K,K KKK ,,, K,K
, , , ,K ,K ,K KIT, KIT, HE SHIS, JOGS,

A SKI, ASKI, TO DO, TO DO, WISH,
IT IS, IT IS, SHE IS, TO US, FOR US.

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Lesson 7 Continued

Try all of the letters you've learned so far.

ANY FLAX, EASY TO FIX, THEY WILL PAY,
HAS SIX OXEN, PUTT TO THE FLAX FIELD.

CUT THE PRICE BY SIX, PAY SIX WEEKS.
LES WILL TRY TO FIX THE AX IF YOU DO.

IN CASH, FOUR OR SIX, WILL PAY YOU,
ASKS THE JUDGE. A HIGH DOCK, JUST SIX.

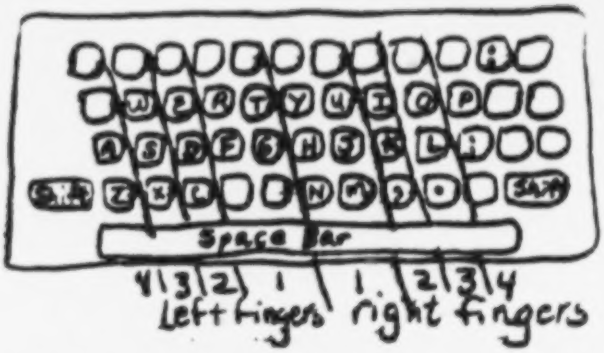
TEST SENTENCES:

Sentence 1: PEGGY HAS WORKED SINCE THE SIXTH OF JULY.

Sentence 2: NEXT, TRY ONE THAT WILL PUSH YOUR SKILL.

OPTIONAL: Review Lesson 6 and try the test sentences again.

Lesson 8 - New Keys: M, Z, :



The "M" is controlled with the right index finger. It's a curve down while keeping the little finger anchored at home on the ":" key. Try the reach: JMJ. When you know where it is, look away and try these lines.

JJJ MMM JMJ JJJ MMM JMJ JJJ MMM JMJ
M M M JM JM JM ME ME AM AM MAY MAKES

ME AM HAM MAY MAP MAKE SAME HAM TO ME;
HE MAY , A HAM; HE MAY MAKE A MAP.

The "Z" is controlled with the left little finger. It's a reach down with the "F" finger at home. Continue with the curl of your little finger as you reach down. Try the reach, AZA. When you feel comfortable in making the reach, look away, then try these lines.

AAA ZZZ AZA AAA ZZZ AAA AZA AAA ZZZ
Z Z Z AZ ZA ZA ZOO ZOO ZAP ZAP ZOOKS

ZA ZA ZAP ZIP ZAG ZIG OZ. OZ. ZONE
TO ZAP, WILL ZIP, THE ZONE PRIZES

The ":" is controlled with the right little finger. It's a reach way up to the fourth row. Try the reach, :P:. When you feel you can reach the key without looking, try these lines.

:P: PPP ::: :P: ::: PPP ::: :P: ::: PPP :::
: : : :P: :P: TYPE: DEAR JO: HTAB:

TO: READ: DATE: TYPE: FILE: REPLY TO: TO WIT:
FOLLOW THESE STEPS: DEAR SIR: DEAR ME. ZOO:

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Lesson 8 Continued

Try these lines reviewing all the keys you know so far:

NJ ED OL AQ P:P WS UJ CD MJ XS YJ RF ,K
GF .L TF HJ ;P: AZ ZA JM MJ MR. TO:

JANICE DUX WILL TYPE FAST: RICK MET HIS GOAL.
IZZY READ: TO MAKE THE TEAM, SWIM FASTER.

TONY SAW A YAK, A FOX, FOUR LYNX, AND A CAT.
ROXY WILL PLAY ALTO SAX IN THE NEXT SHOW.

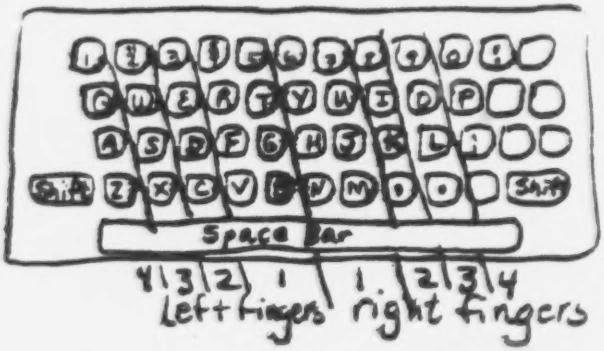
TEST SENTENCES:

Sentence 1: RIP CAN GO WITH LEX TO SKI IN A FEW DAYS.

Sentence 2: ZOE TOLL MAY WIN A GOLD CUP FOR HER JUMPS.

OPTIONAL: Review Lesson 7 and try the test sentences again.

Lesson 9 - New Keys: B, Q, ", V



The "B" is controlled with the left index finger. It's a reach down and over from the "F". Try the reach, FV FB. When you know where the key is, look away, then try these lines.

FFF BBB FBF FFF BBB FBF FFF BBB FBF
B B BF BF BF BY BY FIB FIB RIB RIB BY

BUT BOX BIG BOYS BY FB BF BY ME, BUY IT
BUS BEN BUY BY TUB BOAT BY THEN TUBBY BABY

The "Q" is controlled with the left little finger. It's a reach up while keeping the "G" finger anchored at home. Try the reach, AQA. When you know where the key is, look away, then try these lines.

AAA QQQ AQA AA QQQ AQA AAA QQQ AQA
Q Q Q QA QA QA AQ QA AQUA QUO QUOTE

WHO: QUO QA QUIT QUAY QUIZ QUICK
QUIT QUITE QUIZ QUIZ QUIT PRO QUP

The "V" is controlled with the left index finger. Keeping your "A" at home its a reach down (just curl your finger). Try the reach, FVF. Now try these lines.

FFF VVV FVF FFF VVV FVF FFFVVV
V V V VF VF VF VIM VET TV

VF FV VIEW VIM VIGOR FIVE FLIVVER
VEHICLE ACCTIVATE AVIATE AVIARY VALUE

The " key is the SHIFT of the number 2 key. To shift, use the right little finger to reach the shift. Keep the "J" finger at home, and spread your fingers. While holding down on the SHIFT key, reach up with the left ring finger for the "2". While the shift key is held down, you will get a " on the screen. Try a counting method to do this. Step 1: Reach and hold down the SHIFT key. Step 2: Touch the ". Step 3: Return fingers to the home row. Try this method until it becomes more automatic.

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Lesson 9 Continued

SW" SW" SSS WWW """ SSS WWW """ S"S S"S
" " " SW" SW" SW" PRINT "I AM A ST."

PRINT "TO KNOW ME IS TO LOVE ME."
PRINT "I AM SMARTER THAN THE COMPUTER."

Try all of the keys you know so far:

BOB QUIT THE QUIZ SHOW. DID YOU GET A QUOTE.
WAS IT A QUID PRO QUO. CAN THEY BUY THE BOX.

SO MANY PRIZES AT THE QUIZ SHOW WILL AMAZE YOU.
THE SIZE OF THE TEAM MAY ADD ZIP TO OUR PLAY.

JANTZ WILL FIX MY POOL DESK WHEN THE RAIN QUITS.
ZAMPF DID LOG TRIPS BY JET TO THE TOWNS.

"JACK AND JILL WENT UP THE HILL,"SAID RYAN.
PRINT "THE VALUE OF X AND Y IS EQUAL TO"

TEST SENTENCES:

Sentence 1: JEN IS TO GO BY BUS TO THE CITY FOR THE FIRM.

Sentence 2: "HE IS TO WORK WITH US IF HE IS IN TOWN"

OPTIONAL: Review Lesson 8 or Typing Tutor.

Lesson 10: Review all keys learned

Try these lines:

ION: ION: RAT" "AT" REM PROGRAM LOTS.
WAS. WAS. "NOW" PRINT "TOTAL EXP." PRINT
LOTS. "X", FORCE XWRO REM:::::MEW:HOME
LIGHT BASH INIT HELLO CATALOG RUN WORDS
DELETE WORDS TEXT:HOME PRINT:PRINT

RENAME HORSE, LOW RENAME HORSE, LOW
LOCK RAMPART LOCK ONERR ONERR SAVE XX

INPUT X:PRINT HCOLOR CLEAR:CLEAR HTAB
GOTO SUB STATEMENT ERROR RUN WORDS

RUTH WAS HUNGRY BUT BURNT HER THUMB.
I CONCEDED THAT FRED WAS IRKED.
THE DUTY MIGHT BE HIGH IF HE FIT THE RUBY.

SLOW AS AN OX, SOL SEWED THE HOLE IN HIS SOX.
PAPPY ZIPPED A QUICK SHOT AT A DIZZY QUAIL.
EZRA SAXON SAID THE OLD LAW ON ZIPS WAS QUAINT.

THE JUDGE SAW THAT THE LADY GOT WHAT SHE DESERVED.
WITH STAFFS PAID EQUAL WORK RATES, PAY IS LOW.

FRED EVOLVED TYPING WORK AXIOMS BY JOB TECHS.
AX POINTS QUIVERED AS FLYING BLOWS STRUCK.

JOSEPH QUICKLY BECAME TIRED OF WORKING.
BEEF, MIXED WITH GLAZED QUINCE JAM, MAKES A
VERY POOR LUNCH. HAROLD REQUESTED SIX BLACK
JEEPS FOR MOVING THE PRIZES AWAY.

TEST PARAGRAPH: (Press the RETURN only at the end of each paragraph.)

COMPUTERS ARE DEVELOPING MUCH FASTER THAN AUTOS
EVER DID. IF CARS HAD IMPROVED AT THE SAME RATE
AS COMPUTERS IN THE LAST THIRTY YEARS, A CADILAC MIGHT
NOW COST TWELVE DOLLARS AND HAVE A TOP SPEED OF OVER A
MILLION M.P.H.

THE MOST POWERFUL COMPUTERS IN THE NEAR FUTURE WILL
BE UP TO A HUNDRED TIMES FASTER THAN THE PRESENT ONES.
THEY WILL FIT INTO A CUBE A FEW INCHES IN SIZE, AND THEY
WILL HAVE TO BE KEPT AT SUPER COOLED TEMPERATURES.

POST TEST: Run Typing Tutor, take the test two or three times, and record your best score.

RECORD CHART

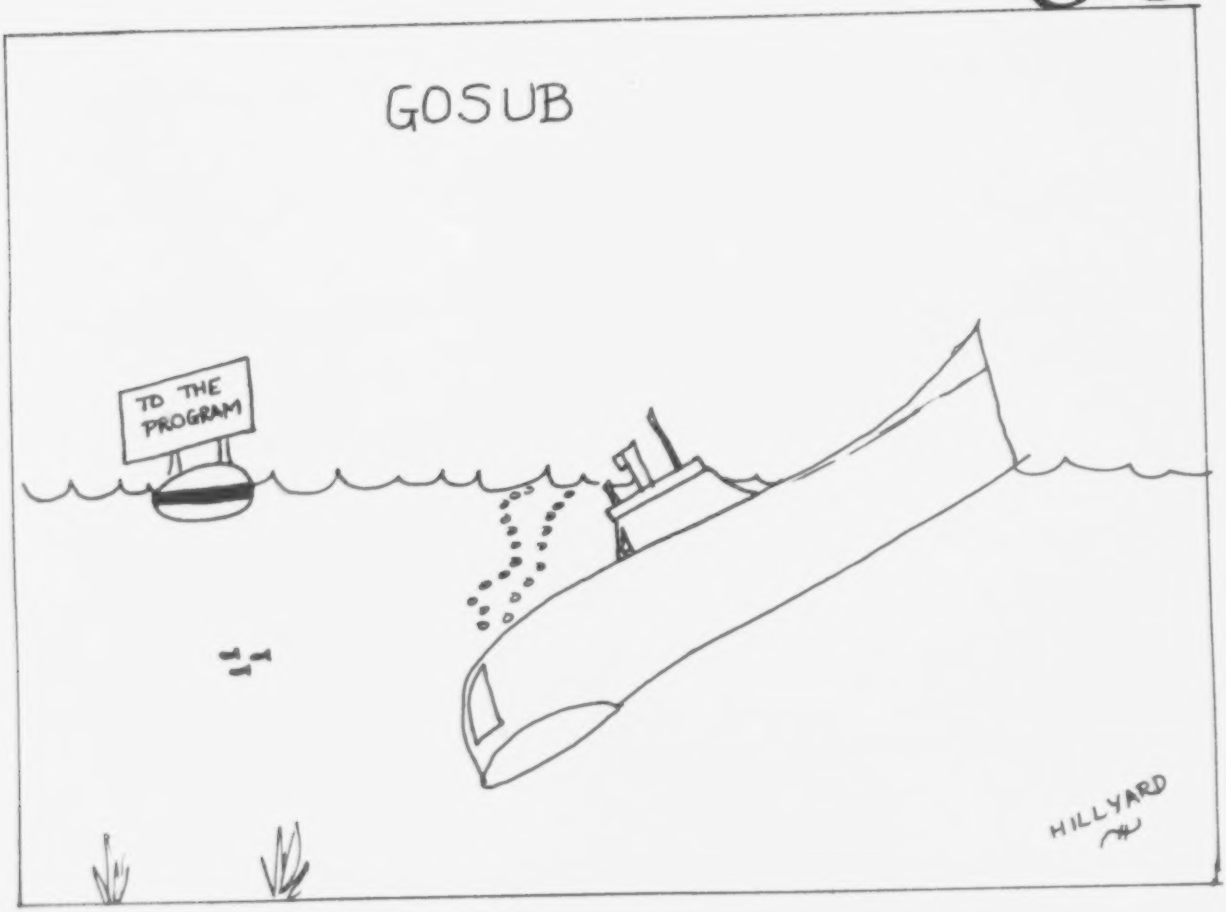
PRETEST: ____________ WPM (Adjusted Score) ________________________

WORDS PER MINUTE

DAY	1	2	3	4	5	6	7	8	9	10
Lesson 1										
Lesson 2										
Lesson 3										
Lesson 4										
Lesson 5										
Lesson 6										
Lesson 7										
Lesson 8										
Lesson 9										
Lesson 10										

POST TEST: __________ WPM (Adjusted Score) ________________________

8.0


GOSUB
TO THE PROGRAM
HILLYARD

SCOPE AND SEQUENCE

The X indicates instruction for that level should occur.

8. The student will learn program generation and usage.

	K-3	4-6	7-8	9-12
The student will:				
8.1 Demonstrate problem solving skills such as flow charting, outlining, etc.	X	X	X	X
8.2 Analyze programs and demonstrate what the output will be.		X	X	X
8.3 Modify programs to obtain different results.		X	X	X
8.4 Recognize that there are a variety of approaches in successfully writing a program.		X	X	X
8.5 Write simple computer programs.		X	X	X
8.6 Locate program errors and make corrections.		X	X	X
8.7 Document a program.		X	X	X
8.8 Demonstrate successful use of commercially prepared programs.		X	X	X
8.9 Determine criteria for deciding appropriate use of computers and software.			X	X

8.1.1
Reference No.

ACTIVITY TITLE: Geometric Shapes

OBJECTIVE: The student will demonstrate problem solving skills.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*		

DESCRIPTION: This primary activity uses geometric shapes to introduce students to outlining, flowcharting, and the logical flow of programming.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES: Computer using LOGO
Delta draw program
Cyber logo program
Turtle graphics program - Nibbels magazine
Apple logo program
Terrapin logo program

8.1.1

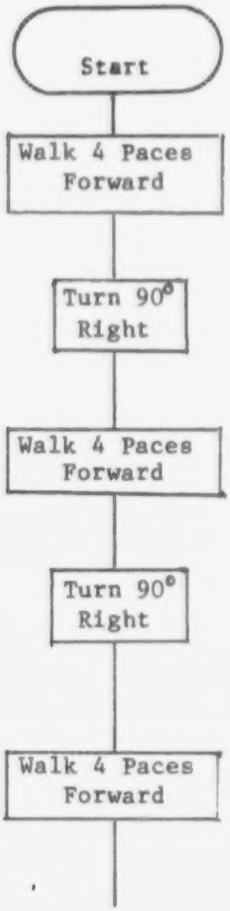
GEOMETRIC SHAPES

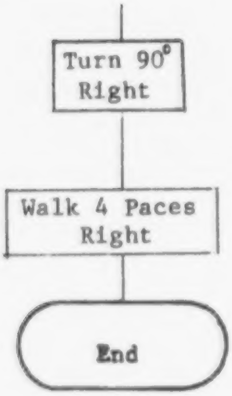
Procedure: First, review some geometric shapes with students so they are sure of how to draw them. Then have students make a shape by pacing it off on the floor. For younger students it may be helpful to use tape to mark the shapes on the floor. Next make a simple outline of these procedures.

Example: To draw a square

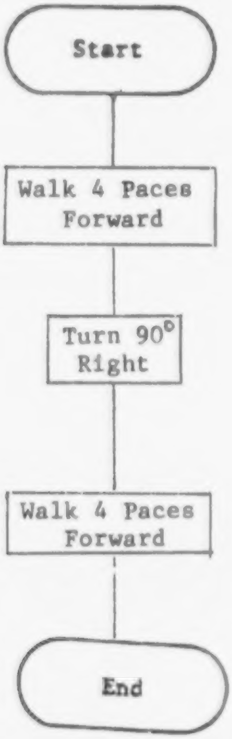
1. Walk 4 paces forward
2. Turn right 90
3. Walk 4 paces forward
4. Turn right off
5. Walk 4 paces forward
6. Turn right off
7. Walk 6 paces forward

This can easily work into introducing flowcharting by changing the above to:


Start
Walk 4 Paces Forward
Turn 90° Right
Walk 4 Paces Forward
Turn 90° Right
Walk 4 Paces Forward


Turn 90°
Right
Walk 4 Paces
Right
End

It is also possible to work this activity into illustrating the concept of a loop by changing your flowchart to:


Start
Walk 4 Paces
Forward
Turn 90°
Right
Walk 4 Paces
Forward
End

Continue the activity with various geometric shapes. An excellent extension of this activity, if you have access to LOGO, is to have students begin to write programs using this simple language.

8.1.2
Reference No.

ACTIVITY TITLE: Comic Ordering

OBJECTIVE: The student will demonstrate problem solving skills.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*		

DESCRIPTION: This activity uses sequences of action out of comic books to introduce the concept of outlining, flowcharting, and the logical flow of programming.

Before class begins, the instructor should cut apart a series of comic book frames. These need to be presented for students to use so you may want to either make several sets or make transparencies so that an overhead projector can be used.

After putting the frames in order, have students make an outline of the action so that some one else could use the outline to put the picture in order. Have students trade with one another and try to use the outlines they are given to reconstruct for proper sequence.

Next, have students translate their outlines into a flowchart format. Again, trade to see how effective their flowcharts are.

MATERIALS REQUIRED: Comic Books

ADDITIONAL RESOURCES: Activity and instructions sheet for activity 8.1.2.
From: Ideas, Arithmetic Teacher, May 1980.

Ideas

Prepared by **Donald W. Schauer, Jr.**
and **David E. Williams**
School District of Philadelphia
Philadelphia, Pennsylvania

Each IDEAS presents activities that are appropriate for use with students at various levels in the elementary school. The activity sheets are so arranged that they can be easily removed and reproduced for classroom use. Permission to reproduce them for such use is not necessary.

IDEAS for this month consists of flowchart activities. A flowchart pictorially represents the steps necessary to perform specific tasks or to find solutions to problems. Each step in the process for solving a problem is listed and in a particular order. Flowcharts can be thought of as blueprints or maps that can be followed to reach a desired result.

IDEAS For Teachers

Objective: To give students experience in ordering sets of pictures.

Levels: 1, 2

Directions for teachers:

1. Remove the master and reproduce one copy for each child. Provide scissors for students' use.
2. Go over the directions carefully; be sure students understand what to do and that each row of pictures is a separate set.
3. After each set of pictures has been put in order, discuss reasons for the set's order. For example, on the second row, first there was one bird on the fence, then another flew down, and then there were two birds on the fence.

Going further.

Provide construction paper and [illegible]. Have students paste their sets of pictures in order on the paper. Display the mounted sets on the bulletin board.

IDEAS For Teachers

Objective: To provide students with experience in putting the steps of a procedure in order on a flowchart.

Levels: 3, 4

Directions for teachers:

1. Provide each student with a copy of the worksheet, scissors, and paste.
2. Be sure students understand the directions. In the procedure for mailing an envelope, there is an order to the steps that are followed.
3. Check students' work before the rectangles are affixed to the flowchart.

Going further.

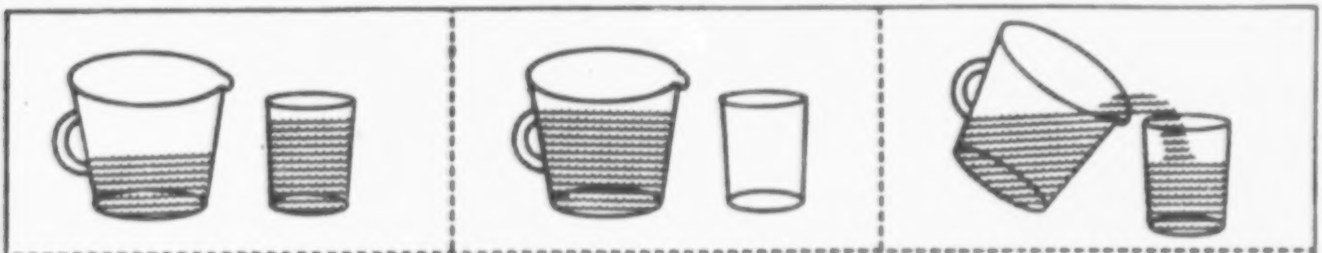
1. Have students make a flowchart to show the steps involved in making a telephone call.
2. Have students make a flowchart to show the steps involved in getting out of bed and dressing in the morning.

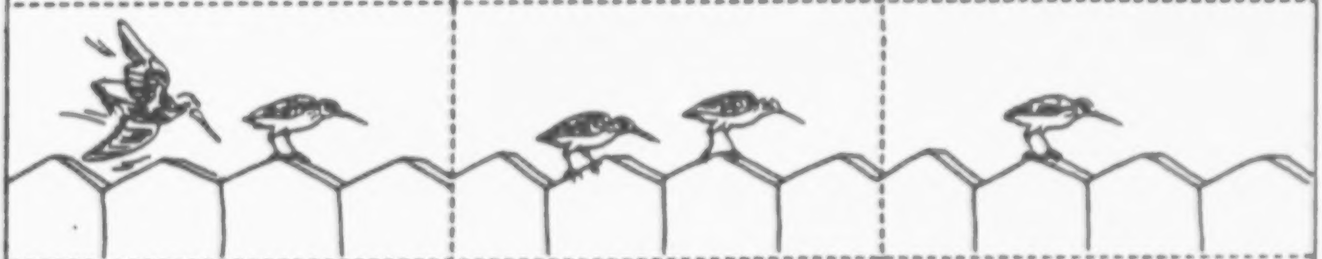
IDEAS

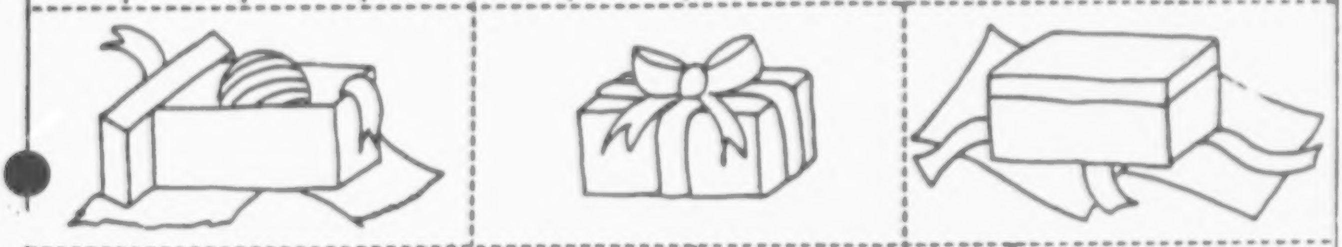
8.1.2

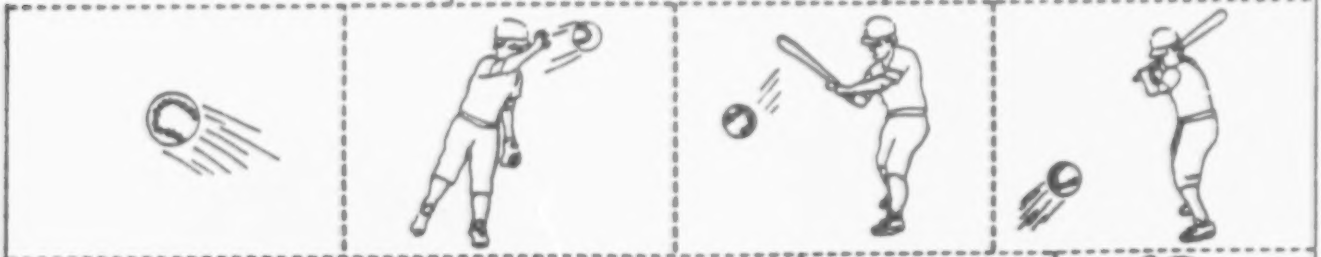
Name ______________________________

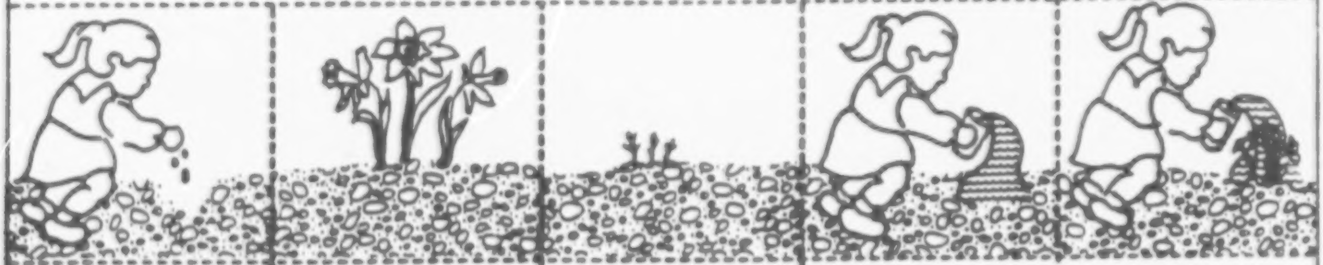
Cut along the dotted lines. Put each set of pictures in order.









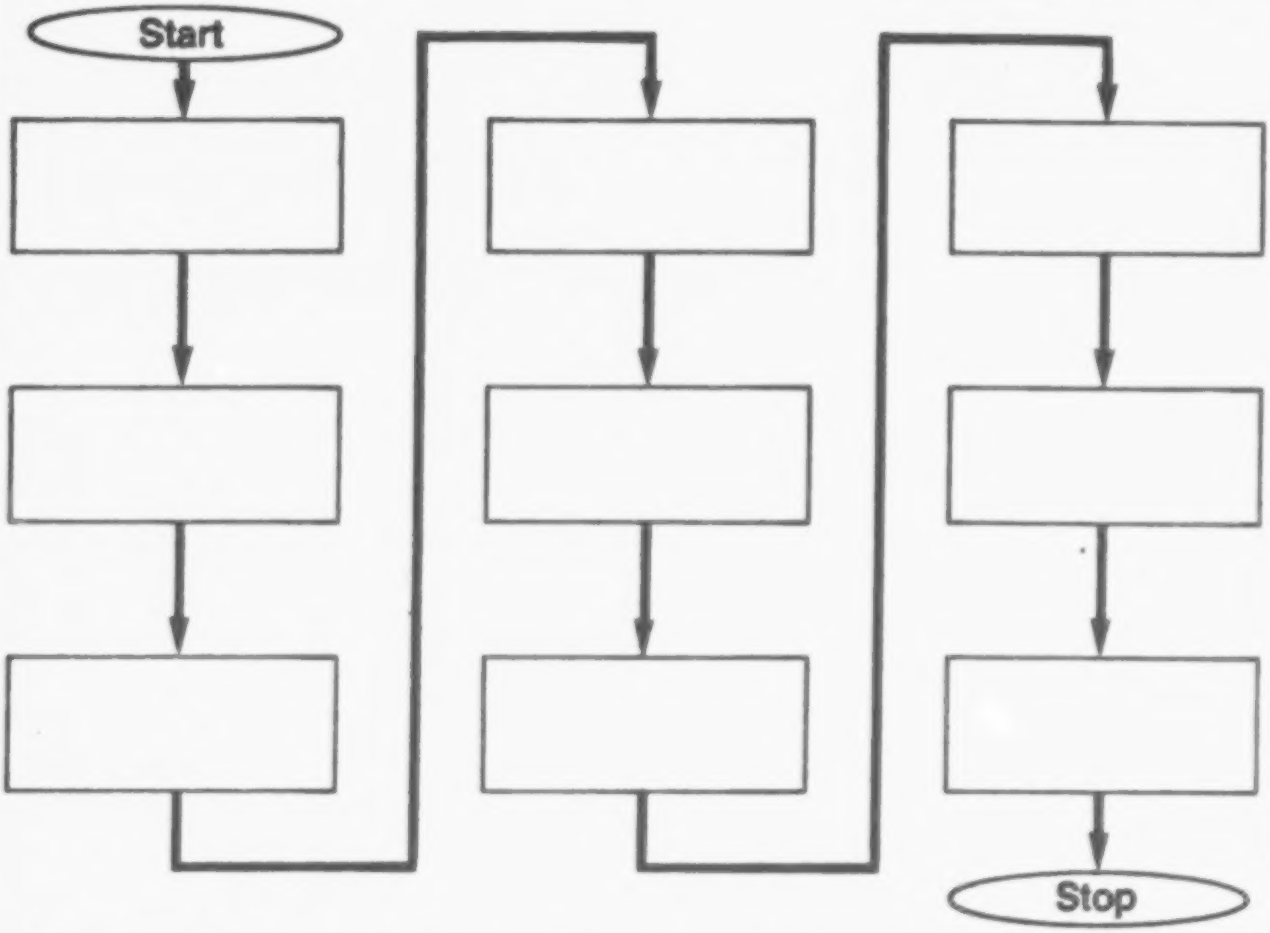


4	1	5	2	3

From the Arithmetic Teacher May 1980

IDEAS

Name________________ 8.1.2



Cut out each direction. Put the directions in proper order, then paste them on the rectangles in the flowchart.

Close Mailbox	Write Address on Envelope	Put Letter in Envelope
Walk to Mailbox	Stop at Mailbox	Put Correct Postage on Envelope
Seal Envelope	Insert Letter in Mailbox	Open Mailbox

From the Arithmetic Teacher, May 1980

8.1.3
Reference No.

ACTIVITY TITLE: Can You Tell Me How?

OBJECTIVE: The student will demonstrate problem solving skills.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: This activity requires a student to write a precise set of instructions to complete an ordinary task and then try the instruction set with another student.

MATERIALS REQUIRED: 3" x 5" cards for each student

ADDITIONAL RESOURCES:

CAN YOU TELL ME HOW?

1. Suppose you have a set of cards, each containing the name of a student. You know a procedure for alphabetizing this set of cards. Write it down in a form that can be understood and followed by a sixth grader. (This is a difficult exercise; most people have had little practice in writing down the details of a complex procedure.)

2. Repeat Exercise 1, assuming that each student has a different student number, the goal being to arrange them in increasing order. Discuss in what ways your two procedures are alike, and how they differ.

3. A recipe is a procedure for preparing food, while a knitting pattern is a procedure for turning yarn into a garment. Name other types of procedures. For each, specify the usual agent and the problem being solved.

4. The Federal Government provides a detailed set of instructions - a procedure - for preparing a federal income tax return. Learning to be the agent who reads, interprets and executes this procedure is a difficult task. An alternative solution to preparing your own tax return is to hire someone to do it for you.

   a. Discuss the educational ramifications of these two methods of solving the income tax return problem.

   b. Give another example with similar characteristics.

   This exercise illustrates a very key idea. There is a difference between understanding the problem to be solved and being the agent that solves it. There are many problems that can be solved by a computer. Thus, the educational issue becomes one of deciding what students should learn to do unaided by machine and what they should be able to do aided by an appropriate machine. This issue has existed since the beginning of formal education, and each new machine adds new dialogue and controversy to it. The computer is such a powerful and versatile machine that it greatly exacerbates the issue.

Permission to use From: The Computing Teacher.

8.1.4
Reference No.

ACTIVITY TITLE: Directions, Directions

OBJECTIVE: The student will demonstrate problem solving skills.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: A series of activities which lead to the concepts of concise instructions, sequencing of instructions, and agents which carry out instructions.

MATERIALS REQUIRED: Activity sheet for instructor
Dictionaries

ADDITIONAL RESOURCES:

DIRECTIONS, DIRECTIONS

1. Students at all grade levels know procedures to solve various everyday problems. For example, students get up in the morning, get dressed, eat breakfast, and go to school. All of these activities tend to become routine, and so are accomplished with little thought. Have students in the class, individually or collectively, identify familiar procedures. For each procedure, indicate the problem solved and the agent. The agent for waking up in the morning may be a parent, and alarm clock or a neighbor's rooster.

   The idea of a procedure may be new to you, and is likely new to your students. It is a powerful, useful idea that is applicable in all academic disciplines. The above activity, and the ones which follow, are "procedure-awareness" activities. They are designed to help you introduce an important concept into the curriculum.

2. Have your students practice looking up words in a dictionary. Then divide the class into teams of two and give each team a word to look up. One member of the team acts as the agent while the second gives directions. The person giving directions is not allowed to see the dictionary and the person using the dictionary is only allowed to follow the detailed instructions being provided by his/her partner. After a word has been found, switch roles. The purpose of this activity is to help students understand the details of the step-by-step process we casually call "using a dictionary".

3. Music can be in a written form, a player piano roll, on magnetic tape or on a record. The agent in performing or playing the music is different in each case. Have students identify the agent and discuss the relative quality of the music, with the advantages and disadvantages of each. Then, have students think of other problems which can be solved by a variety of human and mechanical methods. For each, identify the agent. Weaving or knitting provides an interesting example. The purpose of this activity is to help students see that a problem may be solved by a variety of procedures and agents. There are advantages and disadvantages to each procedure.

4. Many students think it is "cheating" to use a calculator. Explore this idea with your students. Have those who think it is cheating explain why. Have students who think it is okay to use calculators explain why. An activity like this helps students to understand other's viewpoints, and to formulate their own.

5. Select an arithmetic calculation at a level appropriate to your students. For example, fifth graders may be doing multidigit mutiplication. Give a problem to a pair of students. One student uses pencil and paper, doing exactly what the second student says. The second student gives the directions, telling the first student what to write and where to write it.

8.1.5
Reference No.

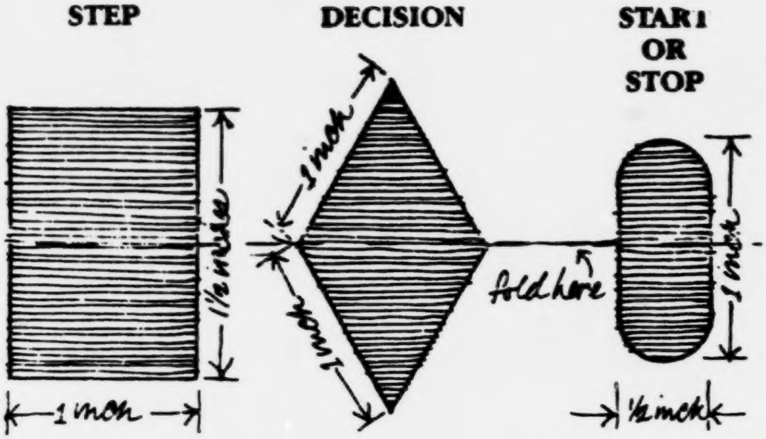
ACTIVITY TITLE: Throwing Out The Cat

OBJECTIVE: The student will demonstrate problem solving skills.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	

DESCRIPTION: Use the activity "Throwing Out The cat" on the following pages to help students understand how to use a flowchart.

FLOWCHART SYMBOLS:


STEP
DECISION
START OR STOP
1 inch
1½ inches
1 inch
1 inch
fold here
1 inch
½ inch

Terminal
(Start or Stop)

Decision
(Yes or No)

Process

MATERIALS REQUIRED:

ADDITIONAL RESOURCES: From: What to do Until the Computer Comes
by Allan Dunn.

A flowcharting template can be made from a 3" x 5" card using the following pattern. It will help make students flowcharts more readable. Fold the card along the dotted line and cut out shaded areas.

THROWING OUT THE CAT
FLOW CHART PUZZLE

(Thanks to Jill Baxter)

Flowcharts can be used to organize a way to solve a problem. This puzzle and the ones you or your class create will help you understand what the different symbols do, and you will also see how to organize a solution to a problem.

Materials Needed:

1. Tape or chalk
2. Chalkboard or chart for flowchart design
3. The accompanying material

Directions:

1. Cut out the different directions and questions on pages 3, 4, and 5.
2. Copy the flowchart on page 2 onto the board or on a chart so all can see. Leave all diamonds and boxes blank.
3. Describe the following problem:

   Our new cat owner has no idea how to put the cat out at night. We must correctly order questions and commands so that our inexperienced friend will know how to get the kitty outside. Remember, our friend is very lazy and always does the easiest action first.
4. Randomly tape the directions on the wall or board and begin organizing the solution.
5. Remember, only START and STOP commands may go in the ovals. Only questions may go in diamond shapes. Only commands or instructions go in rectangles.
6. Check your answer with the one given on page 6.
   Discuss which is more logical and make corrections if necessary.

Try This:

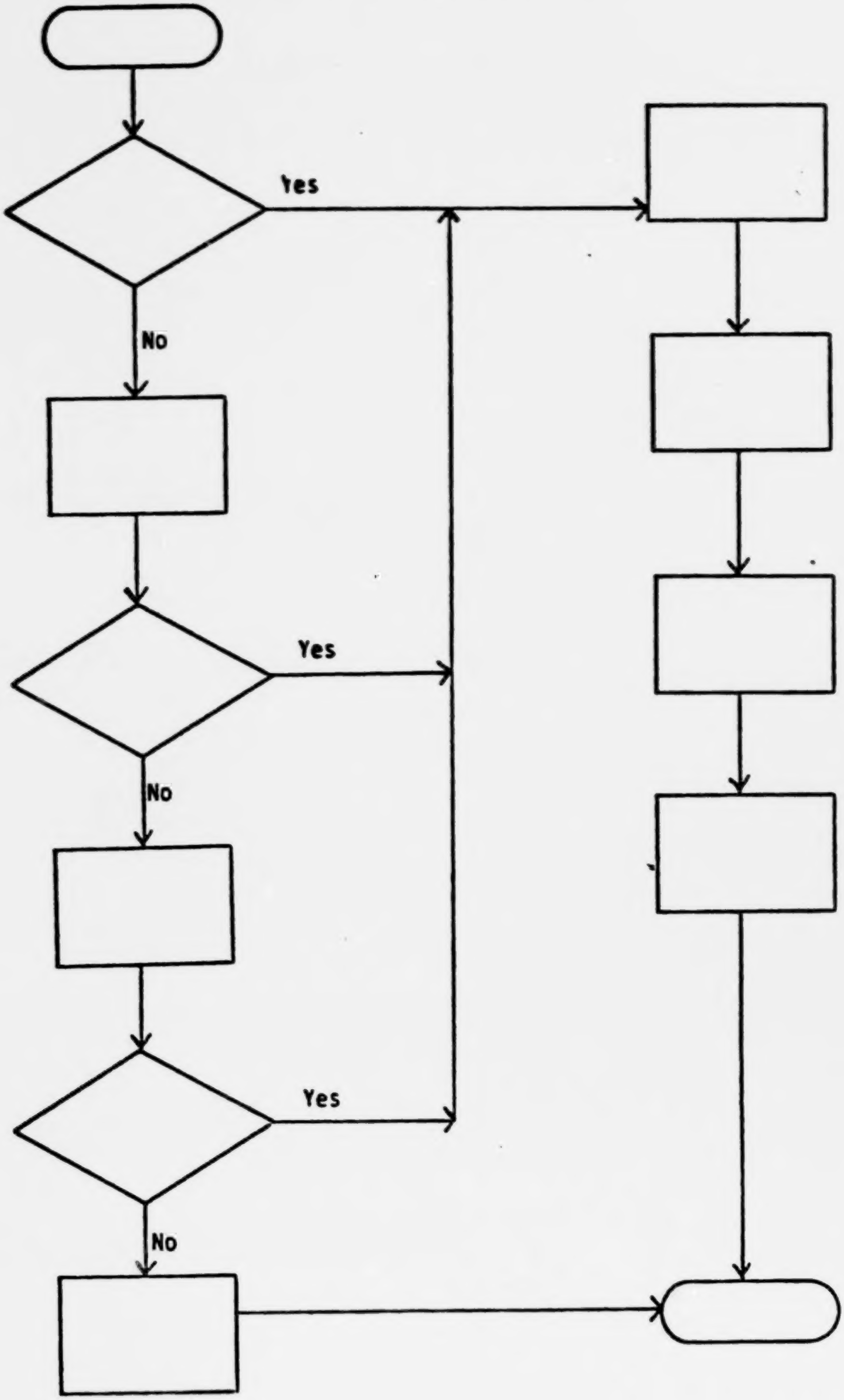
Now that you have done a prepared flowchart, see if you can flowchart another problem. Be very careful to go step by step and make clear what to do at each of these steps. Then prepare an empty flowchart and the instruction cards as done in the example. Describe the problem to others in the room and challenge them to complete the flowchart.

Some suggested problems to help you get started:

1. Starting a car
2. Making a phone call
3. Adding two numbers
4. Finding the largest number in a list of numbers
5. Washing a car

Flowchart Skeleton

8.1.5


Yes
No
Yes
No
Yes
No

can you
see
the cat?

---

open can
of
cat food

473

is cat
meowing at
your feet?

487

---

cat mus
already
be outside

8.1.5

48

START

STOP

474

is cat
sitting in
your lap?

489

look
around
room

8.1.5

490

GRAB

FIRMLY

OPEN

DOOR

TOSS

CAT

475

491

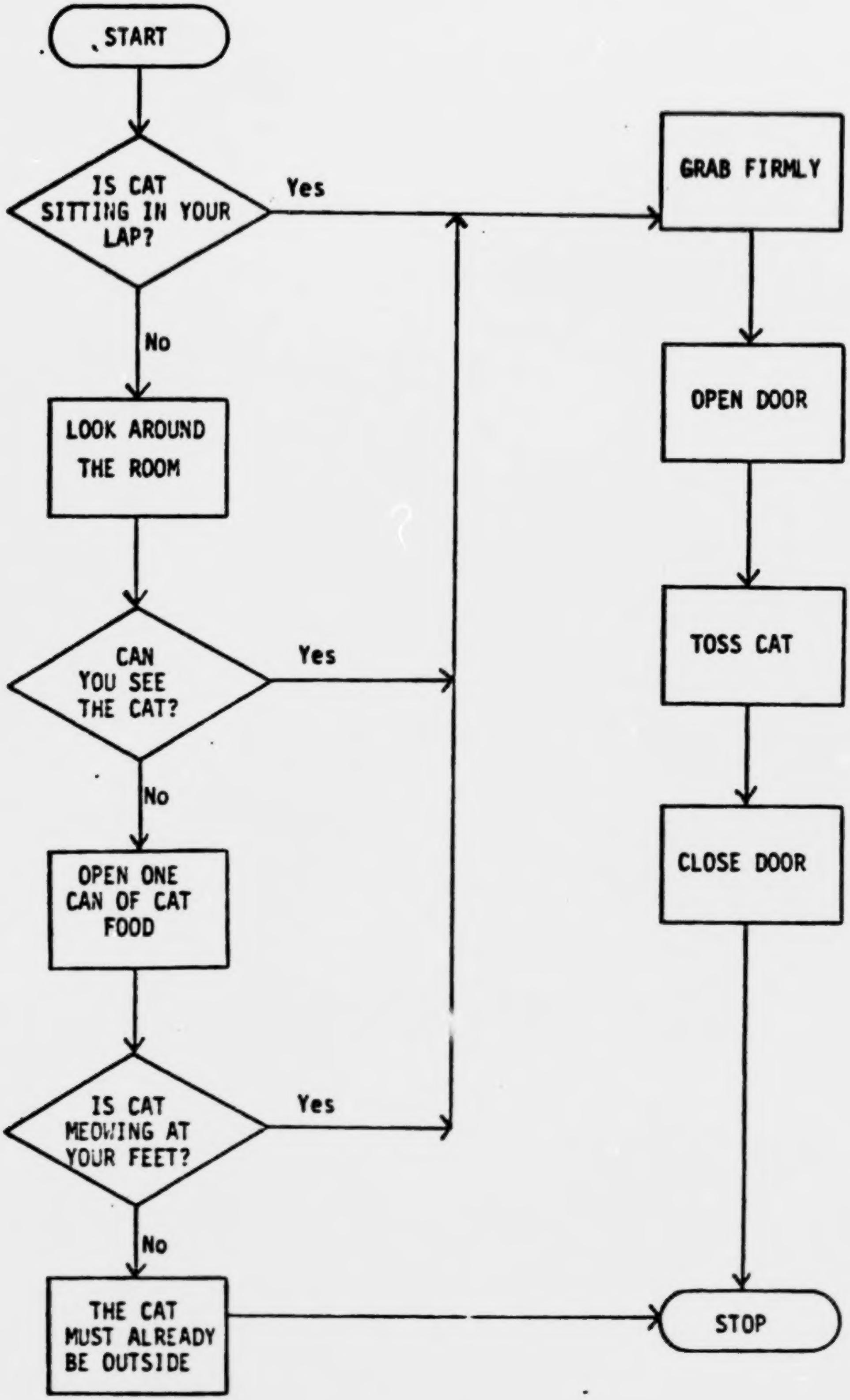
CLOSE

DOOR

8.15

492

Flowchart Puzzle Solution


START
IS CAT SITTING IN YOUR LAP?
Yes
No
LOOK AROUND THE ROOM
CAN YOU SEE THE CAT?
Yes
No
OPEN ONE CAN OF CAT FOOD
IS CAT MEOWING AT YOUR FEET?
Yes
No
THE CAT MUST ALREADY BE OUTSIDE
GRAB FIRMLY
OPEN DOOR
TOSS CAT
CLOSE DOOR
STOP

8.2.1
Reference No.

ACTIVITY TITLE: What Will Appear?

OBJECTIVE: The student will analyze programs and demonstrate what the output will be.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	

DESCRIPTION: Use the activity sheet "What Will Appear" to give students practive in tracing the logic of a computer program to determine what the OUTPUT will be.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

<u>Key</u>:

```
1.  APPLES ARE AWESOME
    PETS ARE DOGS

2.  PETS ARE GREAT TO THE MAX
    APPLES ARE WORMY

3.  CATALOG IS A COMMAND
    CATALOG

    RUN IS A COMMAND
    RUN

    END

4.  I LOVE MY FRANKLIN COMPUTER

5.  5         10          15


6.  SOME COMPUTERS ARE :"
    TRS 80
    PET
```

8.2.1

WHAT WILL APPEAR?

Name ________________________________ Date ___________________________

Instructions: Play computer! For the following programs tell what the OUTPUT will be.

```
              PROGRAM                                       OUTPUT

1.  10 PRINT "APPLES ARE AWESOME"          1.
    20 PRINT "PETS ARE DOGS"
    30 END

2.  10 PRINT "PETS ARE GREAT TO THE MAX"   2.
    20 PRINT "APPLES ARE WORMY"
    30 END

3.  10 PRINT "CATALOG IS A COMMAND"        3.
    20 PRINT "CATALOG"
    30 PRINT
    40 PRINT "RUN IS A COMMAND"
    50 PRINT "RUN"
    60 PRINT
    70 PRINT "END"
    80 END

4.  10 PRINT "I ";                         4.
    20 PRINT "LOVE ";
    30 PRINT "MY ";
    40 PRINT "FRANKLIN ";
    50 PRINT "COMPUTER!!!!!"
    60 END

5.  10 A = 15                              5.
    20 B = 10
    30 C =  5
    40 PRINT C,B,A
    50 END
```

CHALLENGE:

```
6.  10 GOTO 35                             6.
    20 PRINT "SOME COMPUTERS ARE :"
    23 GOTO 70
    25 GOTO 20
    30 PRINT "APPLE"
    35 GOTO 20
    40 PRINT "PET"
    45 END
    50 PRINT "VIC"
    60 PRINT "LISA"
    70 PRINT "TRS 80"
    80 GOTO 40
    90 JUMP OVER THE MOON
```

8.2.2
Reference No.

ACTIVITY TITLE: Give The Output

OBJECTIVE: The student will analyze programs and demonstrate what the output will be.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: The student will act as the computer and determine the output of the following programs.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

Basic Discoveries, Johnson, Jerry, and Malone Linda; Creative Publications.

Problem For Basic Discoveries, Johnson, Jerry, and Malone Linda; Creative Publications.

8.2.2

WHAT WILL APPEAR?

Name ______________________________ Date ____________________

Instructions: Play computer? For the following program tell what the OUTPUT will be.

PROGRAM OUTPUT

1.
```
10 LET A = 9
20 LET B = 12
30 LET C = A + B
40 PRINT C; "="; A; "+"; B
50 END
```
1.

2.
```
10 PRINT "I CAN GO ON FOREVER"
20 GO TO 10
30 END
```
2.

3.
```
10 LET X = 1
20 PRINT X
30 LET X = X + 1
40 GO TO 20
50 END
```
3.

4.
```
10 LET X = 10
20 PRINT Y
30 IF X   30 THEN 60
40 LET X = X + 2
50 GO TO 20
60 END
```
4.

5.
```
10 PRINT "HOW MANY MONTHS IN A YEAR?"
20 INPUT T
30 IF T = 12 THEN 60
40 PRINT "SORRY THAT IS NOT CORRECT, TRY
   AGAIN"
50 GO TO 10
60 PRINT "GOOD JOB!  I HOPE YOU CAN NAME
   THEM."
70 END
```
5.

6.
```
10 FOR I = 1 TO 3
20 PRINT "HOORAY"
30 NEXT I
40 PRINT "FOR COMPUTERS"
50 END
```
6.

7.
```
10 LET A$ = "THE JEDI"
20 LET B$ = "RETURN"
30 LET C$ = "OF"
40 PRINT B$, C$, A$
50 END
```

7.

8.
```
10 DATA "MARY", "JOHN", "RICH", "JANE"
20 PRINT "NAMES OF STUDENTS"
30 FOR X = 1 TO 4
40 READ A$
50 PRINT A$
60 NEXT X
70 END
```

8.

8.3.1
Reference No.

ACTIVITY TITLE: String Along

OBJECTIVE: The student will modify programs to obtain different results.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: This activity requires students to work with MID$ and modify a program to output different letter patterns. Note the first character of A$ is a space.

MATERIALS REQUIRED: Computer
Program to be modified

ADDITIONAL RESOURCES:

8.3.1

STRING ALONG

Type the following program into the computer and indicate the OUTPUT.

PROGRAM **OUTPUT**

```
10 A$ = " ABCDEFGHIJKLMNOPQRSTUVWXYZ"
20 PRINT MID$(A$,14,1)
30 PRINT MID$(A$,10,1)
40 PRINT MID$(A$,12,1)
50 PRINT MID$(A$,6,1)
60 END
```

Rewrite the program so it will:

1. Print your name.

2. Print your first and last name.

3. Print a sentence about you.

4. Print "ACEGIKMOQSUWY".

8.3.2
Reference No.

ACTIVITY TITLE: Print With Commas And Semicolons

OBJECTIVE: The student will modify programs to obtain different results.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	

DESCRIPTION: Use the activity below to give students practice in modifying the PRINT format using commas and semicolons.

PRINT WITH COMMAS AND SEMICOLONS

```
 10 HOME
 20 PRINT "(STUDENT NAME)"
 30 GOTO 20
100 END
```

Procedure: Using the program above or a similar one, students should be given the task of making "Their Name" print in multiple columns across the screen. Next, have students change the program so that the screen is filled with "Their Name".

Modifications: With older students either more complex programs or commercial programs could be used and have students modify the format of how material is displayed on the monitor.

MATERIALS REQUIRED: Computer
Program to modify

ADDITIONAL RESOURCES:

8.3.3
Reference No.

ACTIVITY TITLE: The Change Game

OBJECTIVE: The student will modify programs to obtain different results.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	

DESCRIPTION: Using the worksheet "The Change Game", have students make the program changes indicated. If computers are available, have the students do this activity on the computer. If not, give a written copy of the program and have students appropriately change it.

EXTENSION: For older students, the above program should be made more complicated. It might be appropriate to use a commercial program and have students modify it. It might also be appropriate to take a quite complicated program which doesn't use a name and have students insert their name at a specified place in the program.

MATERIALS REQUIRED: Computer - if available
Copies of "The Change Game" worksheet

ADDITIONAL RESOURCES:

THE CHANGE GAME

Name ______________________________ Date ____________________

Instructions: For each program below, make the change indicated.

1. Change "MIKE" to your name.

```
10 PRINT "THIS PROGRAM IS TO HELP MIKE LEARN "
20 PRINT
30 PRINT "PROGRAM MODIFICATION."
40 END
```

2. Put in the name of your favorite computer.

```
10 PRINT "THE GREATEST COMPUTER"
20 PRINT "IN THE WORLD IS THE ???????????????
30 END
```

3. Put in your own name and birthdate.

```
10 PRINT "HELLO.  MY NAME IS EGGBURT".
20 PRINT
30 PRINT "MY BIRTHDAY IS DECEMBER 32, 2024"
40 END
```

4. Put in your own school and favorite book title.

```
10 PRINT "I ATTEND THE APPLE CONSERVE INSTITUTE"
20 PRINT
30 PRINT "MY FAVORITE BOOK IS TASTY BITS TO BYTE"
40 END
```

8.3.4
Reference No.

ACTIVITY TITLE: Modification Of Loops

OBJECTIVE: The student will modify programs to obtain different results.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: In this activity the student is given a simple program and asked to modify it to give a variety of results.

EXTENSION: For older students a modification might be made so that the output would be words or letters, such as:

```
one
two
three

two
two
three
```

MATERIALS REQUIRED: Computer
Beginning program to be modified

ADDITIONAL RESOURCES:

8.3.4

Modification of Loops

I. Determine the OUTPUT for the following program.

PROGRAM

OUTPUT

```
10 FOR T = 1 TO 5
20 PRINT T
30 FOR I = 2 TO 3
40 PRINT I
50 NEXT I
60 PRINT
70 NEXT T
80 END
```

II. Modify the above program so it will result in the following outputs.

A.

```
123
223
323
423
523
 .
 .
 .
```

B.

```
123 223 323 423...
```

C.

```
123 223 323 423 523
123 223 323 423 523
123 223 323 423 523
 .   .   .   .   .
 .   .   .   .   .
 .   .   .   .   .
```

D.

```
1234523
1234523
1234523
   .
   .
   .
```

8.3.5
Reference No.

ACTIVITY TITLE: Design The Program

OBJECTIVE: The student will modify programs to obtain different results.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: In this activity, the student is given a sample program and asked to modify it to give a variety of results.

MATERIALS REQUIRED: Computer
Student activity worksheet

ADDITIONAL RESOURCES:

Basic Discoveries, Johnson, Jerry, and Malone, Linda; Creative Publications.

Problems for Basic Discoveries, Johnson, Jerry, and Malone, Linda; Creative Publications.

DESIGN THE PROGRAM

```
PROGRAM                                 OUTPUT

10 PRINT "HELLO"                        HELLO
20 GOTO 10                              HELLO
30 END                                  HELLO
```

The above program results in the given OUTPUT. Rewrite the program so that following output will be given.

```
     PROGRAM                                 OUTPUT

1.                                           HELLO

                                             HELLO

                                             HELLO


2.                                           HELLOHELLOHELLO...



3.                                           HELLO  HELLO  HELLO  HELLO...



4.                                           HELLO     HELLO     HELLO
                                             HELLO     HELLO     HELLO
                                                         .
                                                         .
                                                         .

5.                                           HELLO
                                              HELLO
                                               HELLO
                                                HELLO
                                                    .
                                                      .
                                                        .
```

ACTIVITY TITLE: Comparing Methods

OBJECTIVE: Recognize that there are a variety of approaches in successfully writing a program.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: The student should determine what the output would be for each program on the worksheet. Then they should discuss the similarities and differences among the programs. The student should realize that a desired outcome may be obtained in different ways.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

COMPARING METHODS

Look at the following three programs. What will the OUTPUT be for each program? Compare the programs. How are they alike? How are they different?

PROGRAM OUTPUT

1.
```
NEW
10 PRINT "MY NAME ";
20 PRINT "IS ";
30 PRINT "PET."
40 GOTO 10
50 END
```

2.
```
NEW
10 FOR X = 1 TO 10
20 PRINT "MY NAME ";
30 PRINT "IS ";
40 PRINT "PET."
50 NEXT X
60 END
```

3.
```
NEW
10 LET C = 0
20 C = C + 1
30 PRINT "MY NAME ";
40 PRINT "IS ";
50 PRINT "PET."
60 IF C = 10 THEN GOTO 20
70 END
```

4.
```
NEW
 10 PRINT "MY NAME IS PET."
 20 PRINT "MY NAME IS PET."
 30 PRINT "MY NAME IS PET."
 40 PRINT "MY NAME IS PET."
 50 PRINT "MY NAME IS PET."
 60 PRINT "MY NAME IS PET."
 70 PRINT "MY NAME IS PET."
 80 PRINT "MY NAME IS PET."
 90 PRINT "MY NAME IS PET."
100 PRINT "MY NAME IS PET."
```

8.4.2
Reference No.

ACTIVITY TITLE: One Goal - Many Paths

OBJECTIVE: The student will recognize that there are a variety of approaches in successfully writing a program.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: This activity requires that the class first work through one of the activities, Inch Worm, Robots I or Robots II (objective 8.5). Each of these activities require a student to write a sequence of instructions to accomplish a goal. Many different sequences will accomplish the same goal. Choose at least two successful "programs" to write on the chalkboard to compare. Emphasize to students that there are generally several correct approaches in writing programs.

MATERIALS REQUIRED: This activity assumes that the class will first complete Inch Worm (8.5.3), or Robots I (8.5.1), or Robots II (8.5.2) activities.

ADDITIONAL RESOURCES:

8.5.1
Reference No.

ACTIVITY TITLE: Robots I

OBJECTIVE: The student will write simple computer programs.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: This activity requires the student to use a precisely defined series of commands to cause a robot to carry out a task.

MATERIALS REQUIRED: Duplicate set of instructions for each student

ADDITIONAL RESOURCES:

ROBOTS I

A robot is a computer-controlled machine that can carry out a variety of tasks automatically. Most people's image of a robot is a walking, talking, metal, human-like creature with an itelligence similar to that of a human. While a few human-like mechanical robots have been built, none have the intelligence or most other characteristics of a human.

However, robots are now quite standard in modern automobile assembly plants and other manufacturing and assembly operations. These are computer-controlled devices programmed to perform a particular assembly operation such as weld two parts together, screw a nut onto a bolt, or operate a spray painter. Changing the robot's program "teaches" the robot to perform a different task. This is particularly useful in industries like automobile manufacturing where there are periodic model changes. The activities below are designed to give a students insight into the capabilities and limitations of robots.

1. Begin by selecting a student to give directions and by having the teacher serve as the robot. The robot should initially be seated at a desk with a pencil in its' hand. The student is to direct the robot to move to the pencil sharpener, sharpen its pencil, and return to a seated position at the desk. See 2 below for some of the types of instructions that might be given.

   The activity is most instructive and amusing if the robot interprets each instruction with little regard for the consequences. The robot will run into furniture or into the wall, be unable to insert the pencil into the sharpener, and so on. If it is impossible to understand or to carry out an instruction, the robot should respond "That does not compute!" One purpose of this is to begin to understand the need for precision in specifying and executing instructions.

2. The class working together should decide upon a set of allowable operations. Each is a "primitive" operation that the robot is to be able to understand and execute. A typical set of primitive might be:

   a. Pick up pencil from desk.
   b. Set pencil down on desk.
   c. Stand up.
   d. Sit down.
   e. Turn right a specified number of degrees.
   f. Take a specified fraction of a step (up to one full step) forward.
   g. Take a specified fraction of a step (up to one full step) backwards.
   h. Insert pencil in sharpener. This can only be done if pencil sharpener is within easy ready.
   i. Turn handle of sharpener clockwise three times.
   j. Remove pencil from sharpener.

Now 1 above can be repeated, with student taking turn being the robot and the robot programmer. Any instruction other than one of a-j above should cause the robot to respond, "That does not compute!"

3. Suppose the robot can only understand the types of operations a-j given in 2 above. Can the robot be directed to go to a particular student's desk, pick up that student's pen, and place it on the teacher's desk? Can the robot be directed to empty the pencil sharpener into the wastebacket? Questions such as this give insight into the difficulties in designing a programming language - in this case the types of instructions the robot can understand.

   Make up a list of several tasks such as sharpening a pencil, emptying the pencil sharpener into the wastebasket and feeding the goldfish. Have each student make up a robot-programming language that she/he thinks will be suitable for telling a robot how to accomplish all these tasks. Then let students try out their languages on each other for specific tasks.

   Some students will add more special purpose instructions to their language such as "pick up fish food". Others may try to add general purpose instructions directing hand movements. A hand can be opened and positioned correctly and then instructed to grasp the object between its open fingers.

Permission to use From: The Computing Teacher.

ACTIVITY TITLE: Robots II

OBJECTIVE: The student will write simple computer programs.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: This activity is an extension of Robots I, 8.5.1. Robots I should be used prior to this activity.

MATERIALS REQUIRED: Instructions duplicated for students or written on chalkboard

ADDITIONAL RESOURCES: See Robots I, 8.5.1, as a preparatory activity.

SRA Computer Discovery.

ROBOTS II

In the robot activities given in 8.5.1, the person directing the robot did not have to figure out the entire set of directions in advance. Rather, the programmer could continually examine the robot's location and give instructions to overcome difficulties such as a chair in the robot's pathway, as they occurred.

Consider a robot that can execute the following types of instructions.

a. Stand up (from a seated position).
b. Sit down (assumes a chair is immediately behind the robot).
c. Take a specified fraction (up to 1) of a step forward.
d. Turn to the right a specified number of degrees (not to exceed 360 degrees).
e. Extend right arm forward and parallel to the floor until it touches something or until extended to its full length.
f. Lower right arm to robot's side.

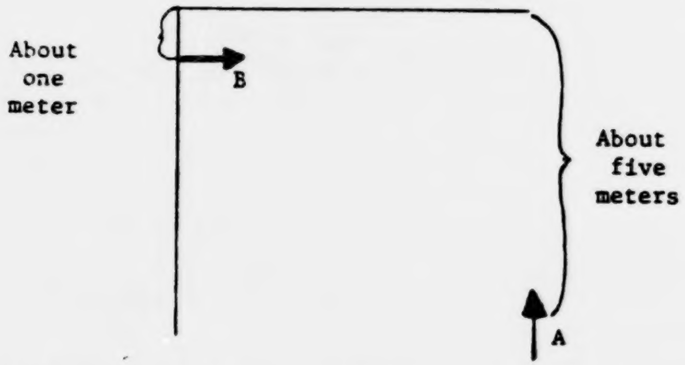
Suppose that the robot has a sense of touch in its right hand and can make a decision based upon the outcome of executing instruction "e". Thus execution of "e" can be followed by an instruction such as, "If something was touched, go to instruction 8. Otherwise, continue with instruction 4". Activity 1 below illustrates what this added capability allows.

1. Suppose the robot is seated facing a wall that is about 5 meters away, and that there are no obstacles in the robot's path to the wall. What will the following program accomplish?

Step #	Instruction
1.	a
2.	c, 1/2 step
3.	e
4.	f
5.	If no touch (in step 3) go to step 2. Otherwise, go to step 6.
6.	d, 180 degrees.

The robot will end up close to, but facing directly away from, the wall. Notice the abbreviations used in writing the program steps. This is much easier than repeatedly writing out long instructions. Give the class several examples of programs involving decision making, and allow each student to gain experience in reading and following such a program. Notice that the robot "remembers" the results of its most recent hand extension. It need not use that information right away.

2. Consider the picture below, where the arrow represents the location of a robot and the direction it is facing. The robot starts at location A, several meters from each wall. The goal is to have the robot end up at location B.



   a. Have each student write a program that is supposed to move the robot from A to B.
   b. Select a student's solution that you are sure is incorrect. Or, use a "solution" from "some other class" that you know is incorrect.
   c. Have one of the students execute the incorrect solution.
   d. Have the class, working together, debug the incorrect solution.
   e. Have the students reexamine their own programs and mentally carry out the steps. In this process it is okay to use pencil and paper. This is called "desk checking" and is a very important aspect of program testing and debugging.
   f. Have students exchange papers, and desk check each other's programs. The papers are then to be returned, and any errors detected are to be corrected.

3. Add the following capability to the robot:

   g. Use your eyes to search for any obstacles located within one half step forward.

   After "g" has been executed, the robot can carry out instructions such as "If obstacle observed, go to step 5. Otherwise, go to step 12". Repeat activity 2 with this new robot, but allowing for a possible obstacle someplace in the way.

Permission to use From: The Computing Teacher.

8.5.3
Reference No.

ACTIVITY TITLE: Inch Worms!

OBJECTIVE: The student will write simple computer programs.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: Students write a "program" (sequence of instructions) to move inch worms on a grid. This introduces programming concepts without requiring a computer.

MATERIALS REQUIRED: Graph paper

ADDITIONAL RESOURCES: SRA Computer Discovery.

INCH WORM!

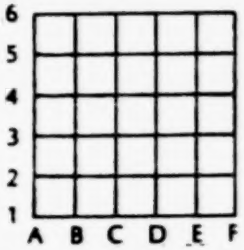
A computer program is a set of directions that a computer can interpret and execute. A major aspect of computer programming is writing precise sets of directions. The exercises below will help students improve their skills at giving and following sets of directions.

1. Have each student take a blank sheet of paper and place his/her pencil near the center of the paper in a ready-to-draw position. Select a simple line drawing and keep it hidden from the student's view. Then "tell" the students how to copy the line drawing. Examples of instructions might include: "Draw a horizontal line 3 cm. in length. Now, starting at the right-hand end, draw a line slanted 45 degrees up and to the right, 5cm. in length." All of this is to be done without the use of a ruler.

   Initially this game should be played with very simple drawings. Students can be asked to identify what is being drawn. Later, students can select or make up drawings and take the role of teacher. Or students can work in small groups so that more students can take the leadership role.

2. Repeat 1 above, this time using graph paper marked off in 1 cm. squares. You will notice an amazing improvement in the quality and recognizability of the results. The graph paper improves the direction-giving language. This exercise gives some insight as to why some programming languages are better than others.

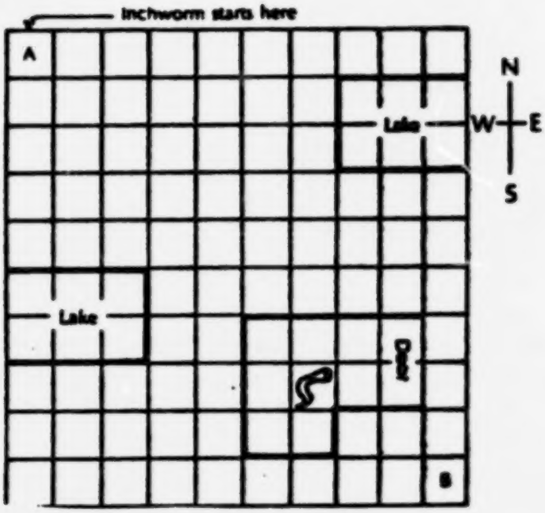
3. A more precise and easy to follow set of directions can be given using a coordinate system on graph paper.



   Each intersection point on the grid can be uniquely identified by a pair of coordinates. Thus, A1 is the lower left hand corner. An instruction such as "start at A1 and draw a straight line to C5" leaves no room for ambiguity. It communicates precisely, and every student following such a direction should produce exactly the same line.

   Students can be given graph paper and asked to label the coordinate axes. Then they can be asked to follow one or more sets of directions given by the teacher. Finally, they can be asked to write down a set of directions to draw something. Papers can be exchanged so that all students get a chance to have their sets of directions executed.

4. A variation on the above types of activities is a game called Inch Worm, which is suitable for quite young students. A small creature, called an inch worm, is to be moved from one spot to another on a squared grid.



A program for the inch worm consists of a sequence of directional specifications, such as EESSSSEESW.

The specification E means the inch worm is to move one square east. the goal is to write a program that moves the inch worm from some starting point, say square A, to some ending point, say square B. Of course one should avoid drowning the inch worm, or having it fall off the board. An inch worm program needs to be debugged and tested, much like a computer program.

After students master the initial game, one can add two more instructions. U specifies the inch worm is to pick up an object, and"D" specifies the inch worm is to set the object down. Now an object can be placed someplace on the grid, say in the house. The inch worm is to be directed to the object's square, to pick up the object (U), to move to some destination, and to set the object down (D).

The concept of looping or iteration, which is very important computer programming, can be illustrated using the inch worm. A pile of ten objects is located on the grid. The problem is to move all of these objects to another specified location, when the inch worm can only carry one of them at a time. After students have written a certain set of steps ten times, you might suggest an abbreviation, such as "Repeat the following sequence ten times."

Permission to use From: The Computing Teacher.

8.5.4
Reference No.

ACTIVITY TITLE: Computer Quiz

OBJECTIVE: The student will write simple computer programs.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: This test is set up for Scantron scoring and for PET oriented students.

MATERIALS REQUIRED: Scantron sheets for each student
Copy of test for each student

ADDITIONAL RESOURCES:

COMPUTER QUIZ

1. Methods of placing data within a program include use of which of the following:

   A. LET
   B. INPUT
   C. READ - (and its partner)
   D. GOTO
   E. All of these commands

2. The READ statement is always accompanied by the _______ statement.

   A. INPUT
   B. LET
   C. THEN
   D. DATA
   E. NEXT

3. The FOR statement is always accompanied by the ______ statement.

   A. INPUT
   B. LET
   C. THEN
   D. DATA
   E. NEXT

4. In a DATA statement, data elements are always separated by

   A. Commas
   B. Periods
   C. Colons
   D. Semi-colons
   E. Quotes

5. A part of a counter is

   A. Forward
   B. Increment
   C. Test
   D. DATA
   E. READ

6. When using DATA statements it

   A. May appear anywhere in program
   B. Must appear at the end of program
   C. Need not appear in program
   D. May be used for strings only
   E. May be used for numbers only

7. When using the IF statement, the IF and its partner

   A. May appear anywhere in program
   B. Must appear in same statement on same line
   C. Must appear at the end of the program
   D. May be used for strings only
   E. May be used for numbers only

8. The IF statement is always accompanied by the _____ statement

   A. INPUT
   B. LET
   C. NEXT
   D. DATA
   E. THEN

For questions 9 to 18 refer to the following program.

```
  5  REM STUDENTS AND THEIR SCORES
 10  S=0
 20  C=0
 30  ? "NAME", "SCORE"
 40  READ N$, SC
 50  IF SC = 9999 THEN 100
 60  ?N$, SC
 70  S=S+SC
 80  C=C+1
 90  GOTO 40
100  A=S/C
110  ? "AVE. SCORE"; A
200  DATA JOE, 50, LOIS, 78, BILL, 79, MARY, 69, CHRIS, 98, ///, 9999
```

9. How many scores will be printed?

   A. 4
   B. 3
   C. 9999
   D. 5
   E. None of these

10. What will be the data output heading?

   A. NAME
   B. SCORE
   C. Both A & B
   D. AVE. SCORE
   E. None of these

11. What's the first value of N$ that will be printed?

    A. JOE
    B. 50
    C. NAME
    D. 9999
    E. None of these

12. Which line tests for end of data?

    A. 40
    B. 50
    C. 70
    D. 80
    E. None

13. Which line figures the average?

    A. 70
    B. 80
    C. 100
    D. 200
    E. 10

14. The following value will be assigned to N$:

    A. DATA
    B. LOIS
    C. 78
    D. Jake
    E. 98

15. The semi-colon in line 110 causes A to be

    A. printed right next to AVE. SCORE
    B. printed below AVE. SCORE
    C. printed in the next column
    D. averaged and printed
    E. none of these

16. The following value will be assigned to SC.

    A. JOE
    B. 50
    C. LOIS
    D. 14
    E. 95

17. Which line totals or sums the scores?

A. 10
B. 20
C. 70
D. 80
E. 100

18. Which line counts the number of scores?

A. 10
B. 20
C. 70
D. 80
E. 100

19. Choose the correct output for the following program.

```
10 FOR J = 18 TO 0  STEP-3
20 ?J
30 NEXT J
40 END
```

```
A.  0   B. 18  15  12  9  6  3  0   C. 18   D. 15   E. None Of These
    3                                  15       12
    6                                  12        9
    9                                   9        6
   12                                   6        3
   15                                   3        0
   18                                   0
```

20. Use the answers for question 19. If line 20 were changed to 20 ?J; the correct output would be A. B. C. D. or E?

21. Choose the correct output for the following program.

```
10 For S = 1 to 5
20 ? "S", "S*"
30 ? S, S*S
40 NEXT S
50 END
```

```
A.   S  S*S   B.  S  S*S   C.  S  S*S   D. S  S*S   E.  None Of These
     1  1         1  1         1  1        1  1
     2  4         2  4         S  S*S      S  S*S
     3  9         3  9         2  4        2  4
     4  16        4  16        S  S*S      S  S*S
                  5  25        3  9        3  9
                                           S  S*S
                                           4  16
                                           S  S*S
                                           5  25
```

22. Use the answers for question 21. If line 20 were changed to 5 ? "S", "S*S" the correct output would be A. B. C. D. or E?

23. Choose the correct output for the following program.

```
10 FOR B = 1 TO 3
20 ? B;
30 ? B + 3
40 NEXT B
50 END
```

```
A.  1  4    B.  1    C.  1 2 3 4 5 6   D.  1 4 2 5 3 6   E.  None Of These
    2  5        4
    3  6        2
                5
                3
                6
```

24. Use the answers for question 23. If line 20 were changed to 20 ?B the correct output would be A. B. C. D. or E?

25. Choose the correct output for the following program.

```
10 FOR BD = 20 TO 2 STEP-5
20 ?BD
30 NEXT BD
40 END
```

```
A.  15    B.  20    C.  20    D.  20 15 10   E.  None Of These
    10        15        15
     5        10        10
     1         5         5
                         2
```

26. Use the answers for question 25. If line 10 were changed to 10 FOR BD = 15 TO 2 STEP-5 the correct output would be A. B. C. D. or E?

27. Choose the correct output for the following program.

```
10 FOR F = 1 TO 8 STEP 2
20 ?F
30 NEXT F
40 END
```

```
A.  1     B.  1    C. 2468   D.  1     E.  None Of These
    3         2                  3
    5         4                  5
    7         6                  7
              8                  9
```

28. Use the answers for question 27. If line 10 were changed to 10 FOR F = 2 TO 8 STEP 2 the correct output would be A. B. C. D. or E?

29. Choose the correct output for the following program.

```
10 LET C = 0
20 ? "BRAIN POWER"
30 C = C + 1
40 ? C
50 GOTO 30
```

```
A.  "BRAIN POWER"   B.  BRAIN POWER   C. BRAIN   D.  1   E. None
      1                  1               POWER       2        of
      2                 BRAIN POWER      BRAIN       3      These
      3                  2               POWER       .
      .                 BRAIN POWER      BRAIN       .
      .                  3               POWER       .
      .                  .                 .
                         .                 .
                         .                 .
```

30. Use the answers for question 29. If line 20 were changed to 35 ? "BRAIN POWER"

31. Choose the correct ouptut for the following program.

```
10 FOR R = 2 TO 6
20 ?R;
30 NEXT R
40 END
```

```
A.  2   B.  2345   C.  23456   D.  2   E.  None Of These
    3                              4
    4                              6
    5
    6
```

32. Use the answers for question 31. If line 20 were changed to 20 ?R the correct output would be A. B. C. D. or E?

33. Choose the correct output for the following program.

```
10 DATA 1, 2, 3, 4, 5, 6,
20 READ A, B
30 ? A; B
40 GOTO 20
```

```
A.  1 2   B.  1 2 3 4 5 6  C.  1   D.  1 2 3   E.  None Of These
    3 4                        2       4 5 6
    5 6                        3
                               4
                               5
                               6
```

34. If line 30 of the program in #33 were changed to 30 ? A + B, the output would be:

```
A.  1 2    B.  3    C.  1    D.  3    E.  None Of These
    3 4        7        2        5
    5 6       11        3        7
                        4        9
                        5       11
                        6
```

35. If line 20 of the program in #33 were changed to 20 READ A, B, C, the output would be

A. 1 2   B. 1 2 3   C. 1 2   D. 1 2 3   E. None Of These

36. If line 10 of the program in #33 were changed to (10 DATA PAT, MIKE, BILL, CAROL) Tthe output would be

```
A.  PAT  MIKE     B.  PAT      C.  A B   D.  MIKE    E. None Of These
    BILL CAROL        MIKE         A B       CAROL
                      BILL
                      CAROL
```

37. In the computer's screen memory there are ______

A. 40 columns, 20 rows
B. 25 columns, 40 rows
C. 40 columns, 25 rows
D. 40 columns, 24 rows
E. None Of These

38. Which of the following programs will cause the Pet to slow down, to count and be delayed momentarily? With any screen display?

A. For S = 1 to 150:?S.
B. For S = 1 to 200
C. For S = 1 to 200:?S;NEXT
D. For S = 1 to 150:NEXT S
E. None Of These

39. Which of the following groups of numbers would be generated by the RND functions?

A. 1, 2, 3, 4, 5, 6, 7, 8, ...
B. 9, 3, 7, 2, 15, 1, ...
C. 1, 2, 1, 2, 1, 2, ...
D. 9, 8, 7, 6, 5, 4, ...
E. 3, 6, 9, 12, 15, ...

40. Which of the following will put an "A" in the middle of the screen?

A. PRINT TAB(20);"A"
B. POKE 32767 + 1, 500
C. POKE 32767 + 500, 1
D. VTAB(12): HTAB(20): PRINT "A"
E. none

41. Byte
42. RAM
43. ROM
44. Bit
45. RUN
46. REM
47. RND
48. END
49. INT
50. LIST
51. BASIC
52. $
53. looping
54. NEW
55. ?
56. *
57. Binary
58. variable
59. CPU
60. CRT
61. K
62. IC

A. Cathode Ray Tube
B. stops a program
C. Beginners All-purpose Symbolic Instruction Code
D. A letter that stands for a number
E. Allows documentation

A. Free Memory - 8 bits
B. Integrated Circuit
C. Erases the program currently in memory
D. Refers to the number system basic to computers
E. Central Processing Unit

A. Read Only Memory
B. Begins a program
C. generated a random number
D. displays a program
E. function that converts a mixed number to an integer

A. smallest amount of processible memory
B. Random Access Memory
C. Symbol for string
D. Reexecution of an instruction many times
E. Will display text or numbers

A. Multiplication function
B. One thousand bytes

8.6.1
Reference No.

ACTIVITY TITLE: Bugs?

OBJECTIVE: The student will locate program errors and make corrections.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: "Bugs" are errors in programs. "Debugging" is the process of locating and correcting errors in programs. The activity on the following page will lead students in this direction without requiring the use of a computer.

MATERIALS REQUIRED: Piano and piano player
Bread (made or baked from a faulty recipe)
See activity 8.5.2

ADDITIONAL RESOURCES:

BUGS?

Recall that a procedure is a detailed step by step set of directions that can be mechanically interpreted and carried out by some agent. It is designed to solve a problem or type of problem. But there is no guarantee of success, and a procedure may contain errors (bugs). Detecting and correcting errors is an important aspect of problem solving.

1. A student has "solved" the following subtraction problems. See if your students can detect the type of error that is being made, describe it, and produce correct answers. If these calculations are not suited to the level of your students, make up some that are.

$$\begin{array}{r}17\\-8\\\hline 19\end{array}\qquad\qquad\begin{array}{r}45\\-28\\\hline 27\end{array}\qquad\qquad\begin{array}{r}193\\-\ 65\\\hline 138\end{array}$$

2. Play a tune on the piano which is familiar to students, but insert one or more errors. See how the students react to these errors. Have them help debug your attempt to play the tune correctly.

3. Bake your students some bread with the salt or some other ingredient missing. A recipe is a procedure. See if your students can detect an error in your recipe. Discuss with the class how one might debug a recipe.

4. Errors in spelling and grammar are bugs in writing. Give students a paragraph that correctly conveys a particular idea but which contains errors in spelling and grammar. Have the students detect and correct the errors.

Exercises:

1. Debugging is an essential feature in the overall process of writing a computer program to solve a problem. In what sense does a musician composing a new piece of music use debugging ideas? Discuss the composing-programming analogy. Then make up and discuss an analogy between programming and writing.

2. Mathematics, especially arithmetic at the elementary and middle school levels, is often taught on an "all right or all wrong" basis. The concept of debugging a partially correct procedure may not be included in the curriculum. Suggest several examples of how more debugging ideas could be introduced into mathematics instruction. How do you think the increased emphasis upon debugging ideas will affect student attitudes and success in math?

Permission to use From: The Computing Teacher.

8.7.1
Reference No.

ACTIVITY TITLE: Documenting A Program

OBJECTIVE: The student will document a program.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*		

DESCRIPTION: Given an 8 line program, the student will add remark statements and write a short paragraph describing the program.

Documenting a program is extremely important for the user to understand the purpose of the program and how it works. It also helps other programmers who might want to change the program.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: Run program on microcomputer.

8.7.1

Name ______________________________

DOCUMENTING A PROGRAM
(4-6)

It's important for users of your program to understand more clearly what the program does.

It's important to include notes for yourself (and other programmers) by using REMARK statements in the program.

Complete the REMARK statements in the program below:

```
10 REM THIS PROGRAM ________________________________________________

20 LET A = 3

30 LET B = 4

40 REM THE NEXT 2 LINES ____________________________________________

50 PRINT "A ="; A

60 PRINT "B ="; B

70 LET C = A + B

80 REM C IS ________________________________________________________

90 PRINT "C=";C
```

Write a description of the program to the user:

8.7.2
Reference No.

ACTIVITY TITLE: Documentation Program

OBJECTIVE: The student will document a program.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Given a 10 line program, the student will add remark statements and write a short paragraph describing the program.

Documenting a program is extremely important for the user to understand the purpose of the program.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES: Run the program on a microcomputer.

DOCUMENTING A PROGRAM
(7-12)

It's important for users of your program to understand more clearly what the program does.

It's important to include notes for yourself (and other programmers) by using REMARK statements in the program below:

Complete the REMARK statements in the program below:

```
 10 REM THIS PROGRAM ________________________________________

 20 PRINT "ENTER A NUMBER"

 30 INPUT A

 40 PRINT "ENTER ANOTHER NUMBER"

 50 INPUT B

 60 REM C IS ______________________________________________

 70 C = A * B

 80 PRINT "YOUR NEW NUMBER IS" C

 90 PRINT "YOUR JOB IS TO FIGURE OUT HOW I GOT THIS NUMBER."

100 PRINT "THANKS FOR PLAYING."
```

Write a description of this program for a user:

8.8.1
Reference No.

ACTIVITY TITLE: Run - Run - Run!

OBJECTIVE: The student will demonstrate successful use of commercially prepared programs.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: This activity is designed to allow students to interact with a commercially prepared "package" which requires precise following of instructions. See activity 8.8.2.

MATERIALS REQUIRED: A computer

Commercially prepared program on cassette or disk which is designed for use with your microcomputer

Instructions, if any, which accompany the prepared program

ADDITIONAL RESOURCES: It is assumed that students have the computer operation skills addressed in goals 7.1, 7.2, 7.3, 7.4.

RUN - RUN - RUN!

1. Obtain a copy of a "packaged program" such as Milliken Math, Reader's Digest Edu-Disks, Mastertype, MECC Disks, Game Show or Computer Discovery. (DB Master, VisiCalc, etc., for more advanced students, Screen Writer, Bank Street Writer, Apple Writer II).

2. Give the disks and instructional documentation to the student to use.

3. If student can utilize the program successfully,

   a. Put student's name on a wall chart for recognition and also as a permanent list of student operators you can use as a resource.

   b. If the program is instructional, utilize the student to demonstrate the program to another class (Math, Language Arts, Social Studies, etc.).

   c. If the program is a utility program (i.e., DB Master, VisiCalc, etc.), have the student find a project which utilizes that program and develop an application which will benefit the school or class.

4. If student cannot successfully utilize the program you gave him/her,

   a. Have student try again on a different package.

   or

   b. Have student try the same package again with a student who has been successful.

   or

   c. Have student review/work through activities for goals 7.1, 7.2, 7.3, or 7.4.

8.9.1
Reference No.

ACTIVITY TITLE: To Use Or Not To Use?

OBJECTIVE: The student will determine criteria for deciding appropriate use of computers and software.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: This activity asks students to look at specific tasks around the home and decide whether it is appropriate to use a computer or not.

Procedure: Begin by brainstorming different activities and tasks around the home. When this list is quite extensive, begin to evaluate the list. This evaluation should be done by placing each item on the list as either "appropriately done" by a computer or "not appropriately done" by a computer.

As an extension with some students, the group could look at the reasons why it is or is not appropriate to use a computer for a task, then create a series of questions which could be used to evaluate whether to use a computer or not.

Another extension idea would be to change the setting from a home setting to a school or occupational setting.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

8.9.2
Reference No.

ACTIVITY TITLE: Good Soft?

OBJECTIVE: The student will determine criteria for deciding appropriate use of computer and software?

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: This activity requires students to view software and evaluate where it is appropriately used.

Procedure: Begin by viewing a piece of software. Then have students answer the questions:

1. What subject area do you feel could appropriately use this piece of software?

2. Why is this appropriate for that subject area?

After answering the above questions for a number of differnt subject areas, have students generalize by asking, "What makes a program appropriate or not appropriate for a specific subject area?" Depending on the sophistication of the group, you may want to develop a software evaluation worksheet from this discussion to be used in considering the value of future software.

EXTENSION: This activity could be very easily generalized to other situations such as the home or an occupational situation. Included is a sample general software evaluation form.

MATERIALS REQUIRED: Various examples of computer software
Student activity worksheet

ADDITIONAL RESOURCES:

SOFTWARE EVALUATION

Name of Software ____

Evaluation ______________________________ Date ________________

1. Was the software easy to use?

    A. Did it have good instructions?

    B. Did it come with documentation (written material) to explain how to use it?

2. Was the software free of errors?

    A. Were there programming errors?

    B. Were there spelling errors?

3. Was it easy to read on the screen?

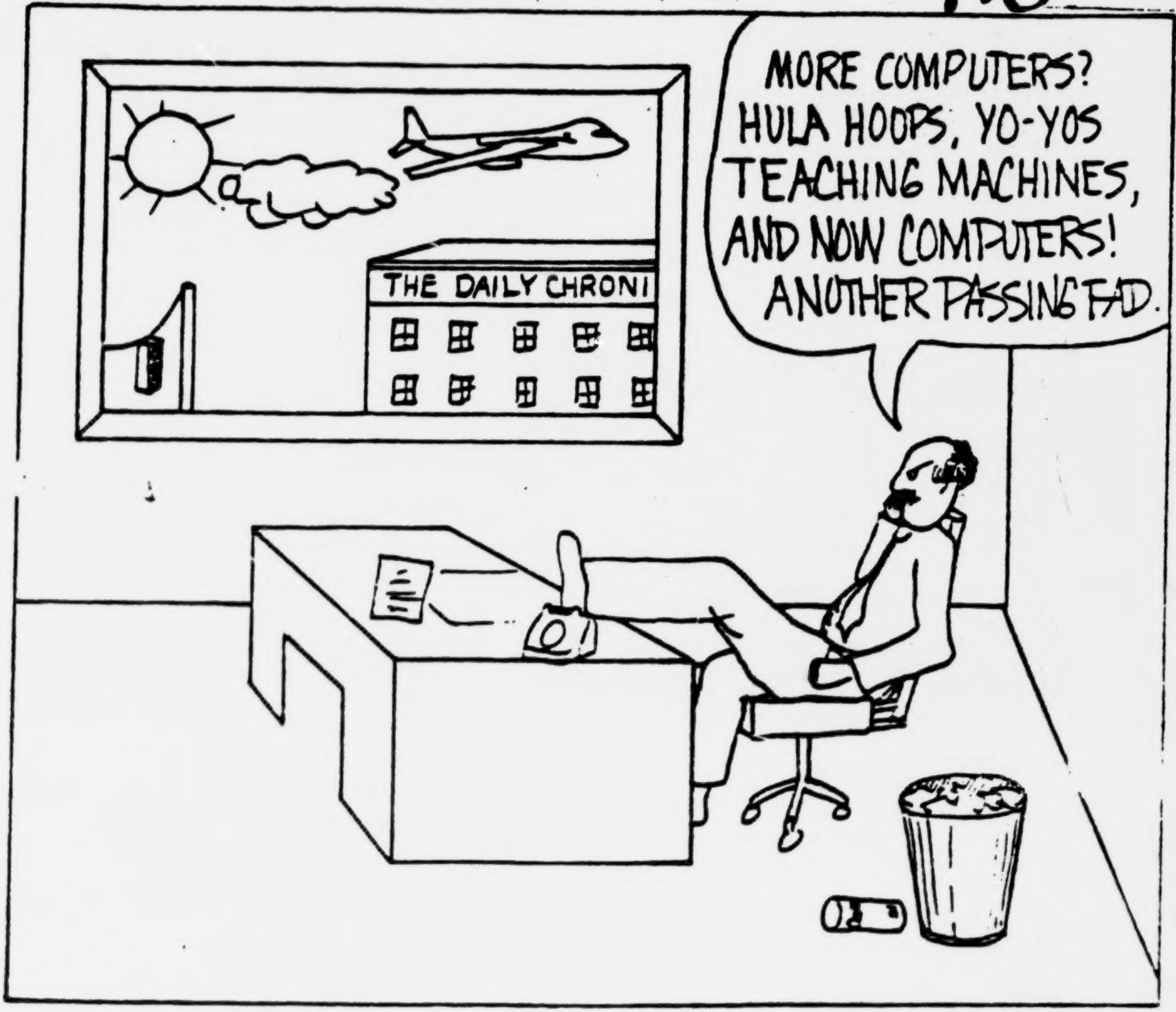
4. What was the purpose of the software?

5. Where is it appropriate - home, school, arcades?

6. Would you use it again?

7. Would you recommend it to someone else?

9.0


MORE COMPUTERS? HULA HOOPS, YO-YOS TEACHING MACHINES, AND NOW COMPUTERS! ANOTHER PASSING FAD.
THE DAILY CHRONI

CAN YOU FIND 5 THINGS IN THE CARTOON PICTURE THAT SHOW CURRENT USES OF COMPUTERS?

The X indicates instruction for that level should occur.

9. The student will learn about moral and ethical implications of computer technology.

	K-3	4-6	7-8	9-12
The student will:				
9.1 Recognize the impact of computers on the privacy of the individual.			X	X
9.2 Discuss the effects of computers replacing human jobs.			X	X
9.3 Be aware of existing and potential effects of computers on individual life, family, and social relationships.			X	X
9.4 Recognize how computers affect decision making and value judgments.			X	X
9.5 Discuss computer crime and software piracy.		X	X	X
9.6 Explore other current and relevant issues.	X	X	X	X

9.1.1
Reference No.

ACTIVITY TITLE: Privacy Questionnaire

OBJECTIVE: The student will recognize the impact of computers on the privacy of the individual.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Have students team up with classmates to ask and answer the following questionnaire. Students only have to answer those questions they want to. Afterwards, you can discuss why certain questions weren't answered. This gives students the opportunity to think about the concept of privacy as it relates to themselves.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, pages 357-358.

Graham, Neill, The Mind Tool, pages 260-268.

Helle, Rachelle and C. Dianne Martin, Bits'n Bytes About Computing, page 133.

Squire, Enid, The Computer - An Everyday Machine, pages 167-170.

"Computers, Spies, and Private Lives" (videotape), Time Life.

PRIVACY QUESTIONNAIRE

1. What is your name? ____________________
2. What is your age? ____________________
3. Where were you born? ____________________
4. What sex (gender) are you? ____________________
5. What is your weight? ____________________
6. What is your height? ____________________
7. What are your hobbies? ____________________
8. What are the names and ages of members of your family? __________

    ____
9. What do your parent(s) do for a living? ____________________
10. How much money do your parent(s) earn? ____________________
11. What is your religion? ____________________
12. Do you believe in God? ____________________
13. What political party do you belong to? ____________________
14. Are you in favor of the draft? ____________________
15. Are you in favor of abortion? ____________________
16. Do you smoke? ____________________
17. Do you use drugs? ____________________
18. Do you use alcohol? ____________________
19. What jobs have you held? ____________________
20. Have you ever been arrested? ______________ For What? _____

    ____
21. Do you have a boy friend/girl friend? ____________________
22. How much homework do you do at night on the average? __________
23. Have you ever cheated on an exam? ____________________
24. What are your plans for the future? ____________________
25. Have you enjoyed answering this questionnaire? ______________

    Why or Why Not? ____________________

9.1.2
Reference No.

ACTIVITY TITLE: Privacy Debate

OBJECTIVE: The student will recognize the impact of computers on the privacy of the individual.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	

DESCRIPTION: Have a debate about individual privacy vs. society's right to be informed. One group will support individual privacy and the other will support society's right to be informed.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, pages 357-358.

Graham, Neill, The Mind Tool, pages 260-268.

Hellen, Rachelle and C. Dianne Martin, Bits'n Bytes About Computing, page 133.

Squire, Enid, The Computer - An Everyday Machine, pages 167-170.

See activity 9.1.3.

9.1.3
Reference No.

ACTIVITY TITLE: Individual Privacy Discussion

OBJECTIVE: The student will recognize the impact of computers on the privacy of the individual.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: The following page gives suggested discussion topics for dealing with individual privacy.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, pages 357-358.

Graham, Neill, The Mind Tool, pagees 260-268.

Heller, Rachelle and C. Dianne Martin, Bits 'n Bytes About Computing, page 133.

Squire, Enid, The Computer - An Everyday Machine, pages 167-170.

"Computers, Spies, and Private Lives" (videotape), NOVA.

INDIVIDUAL PRIVACY

Questions for thought:

1. How does a bank protect an account from others that write checks or use a cash machine and card?

2. Many people complain that they are not "a person anymore - just a number." Why are numbers used in a computer to identify people rather than a name? What would happen if names were used instead?

3. Computers store a great deal of information about people, such as arrest records, bill paying, and hospital stays. List information about people that is usually stored in a computer.

4. Computers can "share" information. One computer can get information from another computer system in an instant if it is programmed to do so. Should information about people (see 3) be "shared" with 1) other computers, 2) employers, 3) law enforcement people, 4) schools?

5. When you purchase a magazine, donate money to a political candidate, or give your name and address to a company, you become part of their computer mailing file. In many cases, businesses sell these addressed to other companies. These companies then solicit you through the mail to buy their product. Should companies be allowed to sell mailing lists?

6. What information does the school have on you? Who has access to that information?

7. Suppose there was a computerized device which could be easily worn that would signal when the wearer is lying. What would the advantages and disadvantages of such a device be? Who would want to use it?

8. How do patients react to having their medical histories collected by computers? Who should and should not have access to their information?

9.1.4
Reference No.

ACTIVITY TITLE: Interviews

OBJECTIVE: The student will recognize the impact of computers on the privacy of the individual.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Collect forms and use them to find the kind of data that is being stored on files about individuals. Discuss the appropriateness and possible infringement of privacy caused by the information.

MATERIALS REQUIRED: Variety of forms for applications:

Social security,
Draft,
Credit card,
Driver's license,
Etc.

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, pages 357-358.

Graham, Neill, The Mind Tool, pages 260-268.

Heller, Rachell and C. Dianne Martin, Bits'n Bytes About Computing, page 133.

Squire, Enid, The Computer - An Everyday Machine, pages 167-170.

See activity 9.1.1.

9.1.5
Reference No.

ACTIVITY TITLE: Privacy Trial

OBJECTIVE: The student will recognize the impact of computers on the privacy of the individual.

GRADE LEVELS:	K-3	4-6	7-8	9-12
				*

DESCRIPTION: Set up the classroom to put PRIVACY on trial. Utilize students as witnesses for and against privacy, as a jury to decide the verdict, as lawyers, judges, etc. This will help develop an awareness of the individual's right to privacy vs. society's need for information.

MATERIALS REQUIRED: Law related information regarding privacy

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, pages 357-358.

Graham, Neill, The Mind Tool, pages 260-268.

Heller, Rachelle and C. Dianne Martin, Bits'n Bytes About Computing, page 133.

Squire, Enid, The Computer - An Everyday Machine, pages 167-170.

See activities 9.1.1 and 9.1.7.

9.1.6
Reference No.

ACTIVITY TITLE: Guest Speaker - Lawyer

OBJECTIVE: The student will recognize the impact of computers on the privacy of the individual.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Ask a lawyer to share information with the class regarding laws which deal with computers and individual privacy (example: Privacy Act of 1974, Freedom of Information Act of 1966-67).

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, pages 357-358.

Graham, Neill, The Mind Tool, pages 260-268.

Heller, Rachelle and C. Dianne Martin, Bitsh 'n Bytes About Computing, page 133.

Squire, Enid, The Computer - An Everyday Machine, pages 167-170.

9.1.7
Reference No.

ACTIVITY TITLE: Privacy Regulations

OBJECTIVE: The student will recognize the impact of computers on the privacy of the individual.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Have students write privacy regulations for school records, covering what information should be contained and who should have access to this information.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, pages 357-358.

Graham, Neill, The Mind Tool, pages 260-268.

Heller, Rachell and C. Dianne Martin, Bit'n Bytes About Computing, page 133.

Squire, Enid, The Computer - An Everyday Machine, pages 167-170.

9.2.1
Reference No.

ACTIVITY TITLE: Unemployment Via Computer?

OBJECTIVE: The student will discuss the effects of computers replacing human jobs.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	

DESCRIPTION: Have students ask their parents if they, or anyone they know, have lost their job because of computer technology.

Then discuss what the possible effects are of losing a job to computers.

Examples: Strained family life,
Financial situation,
Loss of self esteem,
Etc.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Graham, Neill, The Mind Tool, pages 228-238.

9.2.2
Reference No.

ACTIVITY TITLE: Advantages/Disadvantages of Computer Versus Human Jobs

OBJECTIVE: The student will discuss the effects of computers replacing human jobs.

GRADE LEVELS: K-3 4-6 [✓ 7-8] 9-12

DESCRIPTION: Have students individually make a list of advantages and disadvantages of computers replacing human jobs (example: advantages - safety, speed, accuracy; disadvantages - no personal touch, unemployment, etc).

Then have students discuss. You could make a chart of bulletin board with the students' ideas on advantages/disadvantages.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Graham, Neill, The Mind Tool, pages 228-238.

9.2.3
Reference No.

ACTIVITY TITLE: Human Versus Computer Jobs

OBJECTIVE: The student will discuss the effects of computers replacing human jobs.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Have students break up into groups of 3 or 4 and choose one of the following jobs. They should determine how the job would be completed by humans and how the job would be completed by the computer. Discuss differences.

Examples of Jobs: Delivering mail,
Transporting goods,
Checking groceries,
Assembling automobiles,
Making cookies,
Teaching,
Maintaining highways,
Etc.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Graham, Neill, The Mind Tool, pages 228-238.

9.2.4
Reference No.

ACTIVITY TITLE: Computers Replacing Human Jobs Discussion

OBJECTIVE: The student will discuss the effects of computers replacing human jobs.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Use the following suggested discussion topics for dealing with computers replacing human jobs.

Discussion Topics

1. Describe how automation has affected the job market.

2. Why do many people oppose automation even though the jobs replaced by computerized machines are dangerous and boring for humans?

3. "If computers and automation replace most jobs, then many people will be out of work. These people won't have money to buy the products made by automation." This is one argument against automation. Is it valid?

4. Imagine an automated machine to replace a baseball umpire or a football player. Sketch the machine and describe how it would work.

5. Many people, and our society in general, value a work ethic. Describe the value of this ethic in an automated society.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Graham, Neill, The Mind Tool, pages 228-238.

9.3.1
Reference No.

ACTIVITY TITLE: Isolation Story

OBJECTIVE: The student will be aware of existing and potential effects of computers on individual life, family, and social relationships.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	

DESCRIPTION: Have students write a story about a person who does all activities by computer (shopping, working, etc.) and have them imagine what it would be like to communicate with a machine most of the time instead of communicating with human beings.

EXTENSION: Use a word processor to do your writing.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, pages 345-348.

Graham, Neill, The Mind Tool, pages 101-115.

Heller, Rachelle, and C. Dianne Martin, Bits'n Bytes About Computing, pages 135-139.

Squire, Enid, An Everyday Machine, pages 170-171.

9.3.2
Reference No.

ACTIVITY TITLE: Computers Change Society

OBJECTIVE: The student will be aware of existing and potential effects of computers on individual life, family, and social relationships.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	

DESCRIPTION: Show filmstrip described below and then have students complete the appropriate student activity sheet (computers change society).

MATERIALS REQUIRED: Encyclopedia Britannica Educational Corporation "Computers in Our Society" cassette and filmstrip series (computers change society)

Activity sheet for each student from the filmstrip

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, pages 345-348.

Graham, Neill, The Mind Tool, page 101-115.

Heller, Rachelle and C. Dianne Martin, Bits'n Bytes About Computing, pages 135-139.

Squire, Enid, An Everyday Machine, pages 170-171.

9.3.3
Reference No.

ACTIVITY TITLE: Checkless/Cashless Society Debate

OBJECTIVE: The student will be aware of existing and potential effects of computers on individual life, family, and social relationships.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Have a debate about a checkless/cashless society. One group will discuss positive and one group will discuss negative aspects.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, pages 345-348.

Graham, Neill, The Mind Tool, pages 101-115.

Heller, Rachelle and C. Dianne Martin, Bits'n Bytes About Computing, pages 135-139.

Squire, Enid, An Everyday Machine, pages 170-171.

9.3.4
Reference No.

ACTIVITY TITLE: ID Cards

OBJECTIVE: The student will be aware of existing and potential effects of computers on individual life, family, and social relationships.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	

DESCRIPTION: Have a "number only" day at school or in class when everyone is assigned a number. The students must use this number instead of their names for all activities, such as lunch, library check-out, etc. Assign ID cards with the numbers. On the following day discuss how it felt to be a "number".

MATERIALS REQUIRED: ID cards

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, 345-348.

Graham, Neill, The Mind Tool, pages 101-115.

Heller, Rachelle and C. Dianne Martin, Bits'n Bytes About Computing, pages 135-139.

Squire, Enid, An Everyday Machine, pages 170-171.

9.3.5
Reference No.

ACTIVITY TITLE: Potential Effects Of Computers Discussion

OBJECTIVE: The student will be aware of existing and potential effects of computers on individual life, family, and social relationships.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: The following page gives suggested discussion topics for dealing with potential effects of computers on individual life, family, and social relationships.

EXTENSION: Use word processor to write an essay on one or more of the topics.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, pages 345-348.

Graham, Neill, The Mind Tool, pages 101-115.

Heller, Rachelle and C. Dianne Martin, Bits'n Bytes About Computing, pages 135-139.

Squire, Enid, An Everyday Machine, pages 170-171.

DISCUSSION TOPICS

1. Tutorial programs are used on the computer to teach math, language arts, and some job training. As computers and learning packages for them become more common, how will this affect students in the future?

2. The future "newspaper" may be a video display on the computer booked into a large computer with a news data bank. Will this replace our newspapers? How would it affect your life and the life of others around you?

3. Why has the computer been such a valuable tool in law enforcment? What potential dangers are there with using the computer for police work?

4. In the last national election (Reagan - Carter) West Coast people were told hours before the polls closed that early returns from the East had been computer analyzed and it had determined that Reagan had won. How could this information affect the West Coast voter? Should something be done to prevent this problem?

5. As more jobs are replaced by the computer and more computer related jobs are created, how will this affect workers?

6. Is the increasing dependence on computers a dangerous course for society? What would the life style of people in a near totally computerized world be like? What would people talk about and do for entertainment?

7. Future: The computerized bus float brings you to the front of the school. You pick up your porta-computer and homework disk and leave the bus. You pass quickly by the "Omega School" sign on the lawn and enter the newest school in the state and the first to use computer technology whenever possible. Describe the school, the facilities, teachers, students and the attitudes of people in the school.

9.3.6
Reference No.

ACTIVITY TITLE: Computers Affect People!

OBJECTIVE: The student will be aware of existing and potential effects of computers on individual life, family, and social relationships.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	

DESCRIPTION: The True-False Quiz can be used as a basis for discussion of the moral and ethical considerations of computer technology.

MATERIALS REQUIRED: Student activity worksheet

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, pages 345-348.

Graham, Neill, The Mind Tool, pages 101-115.

Heller, Rachelle and C. Dianne Martin, Bits'n Bytes About Computing, pages 135-139.

Squire, Enid, An Everyday Machine, pages 170-171.

Possible answer key:
1. F
2. T
3. T
4. F
5. T
6. F
7. T
8. T
9. T
10. F

COMPUTERS AFFECT PEOPLE!

Computers are having a large impact upon this country and its people. Computers affect you, directly and indirectly. Test your knowledge about this area by answering each of the true-false questions given below.

T F 1. Most of the things computers do cannot be done in any other way.

T F 2. The telephone system makes extensive use of computers.

T F 3. The use of computers in medicine is growing rapidly.

T F 4. Automation, and use of computers, mean almost the same thing.

T F 5. Computers have wiped out many jobs, but they have also created many new jobs.

T F 6. Because computers are so expensive, they won't ever affect most people's jobs.

T F 7. Computers are essential to our space program.

T F 8. In the future, it is likely that computers will strongly affect what is taught in the schools, and will even help teach it.

T F 9. Computers can be used to invade your privacy, by helping to make information about you available.

T F 10. The U.S. Government maintains a large computerized data bank that contains a large quantity of detailed information about every person in the U.S.

Used by Permission of dilithium Press.
From: Are You Computer Literate?, page 91.

9.3.7
Reference No.

ACTIVITY TITLE: Checkless/Cashless Society Debate

OBJECTIVE: The student will be aware of existing and potential effects of computers on individual life, family, and social relationships.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Have a debate about a checkless/cashless society. One group will discuss positive and one group will discuss negative aspects.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, pages 345-348.

Graham, Neill, The Mind Tool, pages 101-115.

Heller, Rachelle and C. Dianne Martin, Bit'n Bytes About Computing, pages 135-139.

Squire, Enid, An Everyday Machine, pages 170-171.

9.4.1
Reference No.

ACTIVITY TITLE: Play - How Computers Affect Decision Making And Value Judgements

OBJECTIVE: The student will recognize how computers affect decision making and value judgments.

GRADE LEVELS:	K-3	4-6	7-8	9-12
			*	*

DESCRIPTION: Have student develop a play dealing with the topic "How Computers Affect Decision Making and Value Judgments". The students should first research books as references for use as background. The whole class should be involved, each in one or more of the following areas:

Speaking
Props
Script
Directing
Etc.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, pages 351-356.

9.4.2
Reference No.

ACTIVITY TITLE: Journal

OBJECTIVE: The student will recognize how computers affect decision making and value judgments.

GRADE LDVELS:	K-3	4-6	7-8	9-12
			*	

DESCRIPTION: Have students keep a journal for one week recording each situation which requires making a decision. Then have students discuss whether or not a compute was involved in the decision or the value judgments leading to the decision.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, pages 351-356.

9.5.1
Reference No.

ACTIVITY TITLE: Is It A Crime?

OBJECTIVE: The student will discuss computer crime and software piracy.

GRADE LEVELS:	K-3	4-6	7-8	9-12
		*	*	*

DESCRIPTION: Have a dicussion to talk about what computer crime is. On the following pages are some example questions to stimulate discussion.

MATERIALS REQUIRED:

ADDITIONAL RESOURCES:

Graham, Neill, Computers and Computing, page 341.

Graham, Neill, The Mind Tool, pages 219-225.

Heller, Rachelle and C. Dianne Martin, Bits'n Bytes About Computing, pages 139-141.

IS IT A CRIME?

1. Is it a crime to copy a commercial program to sell to someone else?

2. Is it a crime to copy a commercial program to give to a friend?

3. It is a crime to receive a "pirated" copy of a commercial program?

4. Should it be illegal to sell programs like "Locksmith" which can be used to copy other disks?

5. Is it a crime to give a friend or classmate your password to a large computer system?

6. Is it right to give a copy of a program to a friend for a homework assignment?

7. If you noted a computer error on prices at the store or there was a mistake in your checking summary, what would you do?

8. As a bank employee, is it right to "electronically" borrow money from an account if you plan to pay it back quickly?

9. Is it right to use a company phone line to conduct computer communication for personal use?

10. Is it right to collect and use other person's codes and passwords?

11. Is it right to sell a program you have written to someone, but not tell them it has a few "bugs" in it?

12. Is it right to sell a program which can't be changed to fit the needs of the user?

COMPUTER CRIME DISCUSSION

Discussion Ideas

1. Is computer related crime different from other crimes?

2. Describe at least five types of computer crime. Which is the most serious - the least serious.

3. Should police be able to keep computer files on every person in their jurisdiction?

4. Why is it so difficult to detect computer crime? Why, are the persons who commit a crime and are caught often not punished?

5. Why is it difficult to protect computer programs for personal computers?

6. If it were impossible to protect software from being copied, how would that affect the people who make and sell software?

7. When is it not wrong to copy software?

8. You have spent over 600 hours writing a fabulous educational arcade game that you plan to sell. Some students at the school - friends - want a free copy of your program. What will you do?

9. A new friend you just met at a computer contest has offered you a copy of a game he has. It is the game you spent 600 hours writing and gave copies to your school friends. How do you feel and what are you going to do?

9.6.1
Reference No.

ACTIVITY TITLE: Scrap Book

OBJECTIVE: The student will explore other current and relevant issues.

GRADE LEVELS:	K-3	4-6	7-8	9-12
	*	*		

DESCRIPTION: Have students keep a scrap book of current newspaper and magazine articles dealing with moral and ethical implications of the computer. Discuss as a class.

MATERIALS REQUIRED: Newspapers
Magazines
Etc.

ADDITIONAL RESOURCES: